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The Illumination Congress

THE eighth International Illumination Congress, the first ever held in Great Britain, opened on Tuesday. The distinction was also conferred upon us of having a fellow-countryman, Mr. C. C. Paterson, as president. The London Section, now completed, was celebrated by an impressive display of flood-lighting, which must surely have been a revelation to the people of London, and attracted the biggest crowds since Armistice day. It is perhaps natural that in the excellent publicity which the Congress has received the Press should have dwelt on this wonderful display, but it must not be overlooked that the serious work of the Congress and the subsequent International Commission on Illumination, involving the presentation of something like 150 papers and reports, begins only to-day. Nothing but good can come of this interchange of views between experts from so many different lands; we hope that they will carry away with them pleasant memories of their stay in London, and that the remainder of the tour will prove equally entertaining. Besides adding to our knowledge of illumination this Congress should result in many new friendships being formed and new ties created.

The Congress will also serve to impress on the public mind how illuminating engineering, once described by Professor Sylvanus P. Thompson as "the Cinderella of Sciences," has come into its own, and also how immense are its potentialities.

Few inventions have wrought so great a revolution in the life of our race as those, well within living memory, pertaining to illumination. One need be barely middle-aged to have experienced the difference that electric light has made in our homes, offices, and factories—the difference in the conditions of working and reading when daylight fails, in our amusements, and in our whole social and industrial activities.

Although it was in lighting that electricity found its first popular acceptance, and although there is no doubt of its pre-eminence for the purpose in the public mind, there is still every need to educate its users to take full advantage of what is offered them and not to remain content merely to substitute electric lamps for gas fittings. With modern high-efficiency lamps and suitable tariffs it is possible to use electricity for decorative purposes at a cost for energy that only a few years ago would have been considered impossible.

Those who throughout the whole country will have witnessed the lighting displays arranged for the occasion of the International Illuminating Congress will not readily dissociate them in their minds from the name of Faraday, the centenary of whose vital experiment on August 29th, dealt with by us in our last issue, they so closely follow. There must have been quite 10,000 kW of additional lighting switched on at 9 p.m. on Tuesday in the towns of this country. The illuminations therefore possess a double significance, not only to ourselves but also to the hundreds of distinguished illuminating engineers who are our guests. They show to what a very high stage British technique has attained and they also show that we are capable of appreciating the worth of a great scientist.

Nevertheless, we cannot leave it at that. This September's illuminations must not be regarded merely as a temporary display. If we wish to make a truly enduring monument to Faraday no less than to do what is in our own best interest, the demonstration must be regarded as a starting point for a new conception of the use of light.

Water-heater Losses

THE author of "The Electric House" this week complains that the heat losses associated with electric water heaters are much greater than is generally estimated, as the makers' figures apply only to the tank and not to the pipes. It is for the installation or supply engineer to inform the consumer what his losses will be; the manufacturer can hardly be expected to estimate for pipe losses which are likely to differ greatly between any two installations. The important point, however, is that the consumer should certainly not be mis-led—to lose a consumer because of the losses is better than to gain him and then make him dissatisfied. Probably many supply undertakings are not blessed with a consumers' engineer capable of dealing with the technicalities of water heating purely as such, but a little co-operation between the manufacturer and the undertaking should overcome the difficulty.

Electrical Production

IN our last issue we suggested that the curve of electrical production showed a series of three-year cycles and that in June the lowest point of the current cycle had been reached. Some justification for our hope that electrical production was about to move upwards is derivable from the latest B.E.A.M.A. Index figure. This shows that in July production was 84.1 per cent. of the 1924 volume, as compared with 82.0 per cent. in June and the April-June quarter. This turn for the better will no doubt be stimulated by the restoration of national confidence for which we hope.

Householders' Lamp Stocks

WE do not carry on our retail electrical business here exactly as they do in the United States, and when one quotes the methods used there it does not necessarily mean that we do so with the idea of urging emulation. But whether the actual method be applicable here or not, there may be profit to be gained from just weighing up the spirit which inclines our trans-Atlantic confrères to adopt a particular course. Take as an example of this kind of thing the means employed for pushing the sales of electric lamps—one of our smallest products—in volume to the user. The *International Merchant*, organ of one of the big electrical manufacturers, points out to agents that it is easy to remember the large profits that ensue from the sale of a large electrical appliance, but still easier to overlook the "vast profits" (the words reflect U.S. conditions!) that can be realised from small articles such as lamps, sold in volume. The writer says that there are few items in the electrical store that offer so ready and immediate means of *increased* profits as do electric lamps. It is suggested that there are to-day more homes with empty lamp sockets than there are homes with a lamp in every socket. Of course this custom of moving lamps from room to room exists here—nearly every wired home is short of lamps, whereas for convenience the owner ought to carry a stock whether they are in lampholders or not. Lampsellers should bring home to the public the advantage of keeping spares on hand.

"Door-to-Door" in Australia

THE writer quotes Australian experience. There business has been hit harder than most other places, but special salesmen who are going from home to home carrying a board fitted with sample lamps are "selling an amazing number of lamps" merely on commission, the only investment risked being the small cost of the boards containing the sample lamps and the printing of the forms. One man is doing so well that he employs a number of salesmen and pays them out of his own commission. The advice given bearing upon American conditions is that the numbers of unemployed men walking the streets hunting for work should be employed to serve as special door-to-door salesmen. The practice may not be favoured here; indeed it will be recalled that on several occasions we have stressed the nuisance that door-to-door canvassers for electrical appliance business have caused to the householder bringing the business into disfavour both with him or her and with the local contractor.

The Season Starts

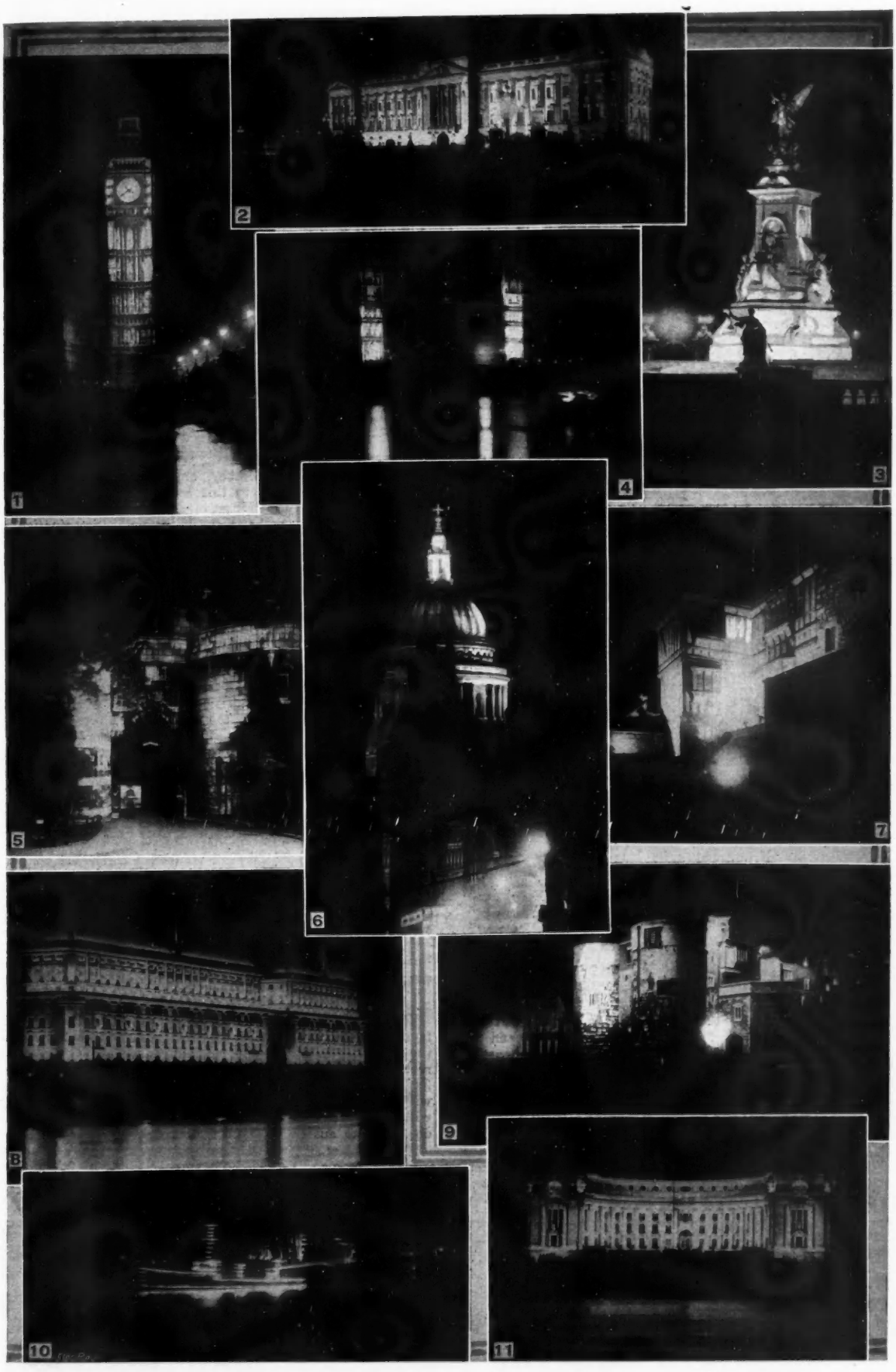
ALTHOUGH electrical appliances can be sold all the year round, there is no doubt that the autumn and winter provide a stimulus to the purchaser. In the Press and on almost every hoarding the reader and passer-by are exhorted to buy electric lamps. If it were only possible to raise the propaganda on behalf of some other electrical applications to such a pitch, enormous benefits would accrue to the industry. If the public were confronted on every hand with large posters showing a typical electric cooker or fire the electrical idea would be driven home far more effectively than by the occasional advertising which they now encounter. In this respect, once again, the gas industry has it; who among our readers has not had the latest type of gas cooker thoroughly impressed upon his mind by the consistent advertising in the Press and on the hoardings? It is a hopeful sign that one of the leading electric cooker manufacturers is steadily pursuing a sound propaganda policy in magazines and other periodicals. We would like to see more of it, and we believe the expense would be justified.

The Mines Reports

THE Reports of the Secretary for Mines and of H.M. Chief Inspector of Mines for 1930 show that the number of fatal accidents in mines has progressively diminished since the beginning of the century. This improvement cannot be unrelated to the increasing use of electricity in our coalfields. Three out of the 70 deaths caused by explosions of firedamp were directly due to electricity, but it is in this class of accident that the improvement has been most marked and but for the use of electricity the total figure would probably have been much higher. In none of the three cases, however, should an accident have occurred, if there had been reasonable care in operation and efficiency in maintenance. Strictly relevant to this aspect is the opinion expressed by the Committee of Inquiry into the Qualifications of Colliery Officials that the time has come for the duties and qualities of mechanical and electrical staffs to be defined by statute or regulations.

The Wiring of Historic Buildings

FROM time to time the public is shocked to hear of the destruction by fire of some fine old country house or other historic building. The causes of such conflagrations are generally obscure, but—following tradition—they are frequently, and almost always erroneously, attributed by the popular Press to electricity. It is very much easier to rebut the slander, if it can be proved that the electrical installation (if any) was carried out on the soundest possible lines. In a letter to the Society for the Protection of Ancient Buildings and published in its annual report, Dr. F. J. Waldo, Senior Coroner for London, mentions that he has suggested to the Corporation of London that the adoption of the I.E.E. Regulations for the Electrical Equipment of Buildings should be made compulsory in the wiring of all new premises in the city. The Society will no doubt point out to the owners of old buildings the need to adopt precautions against fire from any cause; we are concerned here only with eliminating any risk of electricity being a cause through faulty installation. We would suggest to the Society that it should actually recommend the use of electricity in such buildings, subject to the installation work being carried out in a suitable manner by a reliable firm of contractors.



(1) Parliament's clock tower, "Big Ben" (2) Buckingham Palace (3) Victoria Memorial (4) Tower Bridge
(5, 7 and 9) Tower of London (6) St. Paul's Cathedral (8) Thames House, Millbank (10) H.M.S. "Scout" (11) County Hall

London Floodlighted for the International Illumination Congress

D

The International Illumination Congress

A preliminary account of the opening events in London

THE International Illumination Congress duly opened on Tuesday this week when Mr. C. C. Paterson, the President, and others prominently associated with illuminating engineering and the lighting industry were present at the reception bureau at London University in order to greet delegates from all countries. Although the original estimate of the attendance was in the neighbourhood of 400, there were over 500 names on the official list when the Congress opened, something like twenty different countries being represented.

It is quite impossible to do more this week than refer to a few of our many distinguished visitors, but we notice on the list the names of Dr. L. Bloch (Germany), Prof. E. C. Crittenden (U.S.A.), Sig. Clerici (Italy), Mons. A. Filliol (Switzerland), Prof. Fleury (France), Dr. N. A. Halbertsma (Holland), M. Jouaste (France), Dr. Koch (Austria), M. Leblanc (France), Dr. M. Luckiesh (U.S.A.), M. Maissoneuve (France), Prof. Dr. M. Pirani (Germany), and Prof. J. Teichmuller

Distinguished foreign delegates: Mr. G. P. van de Werfhorst, Mr. W. Wissmann, and Dr. J. J. Schneider

(Germany), all names well known in connection with illuminating engineering.

Proceedings in London

The programme in London (from September 1st to 3rd) was mainly social. It included facilities for visiting the E.L.M.A. Lighting Service Bureau, the G.E.C. research laboratories at Wembley, the National Physical Laboratory, and other institutions of special interest in connection with lighting, as well as places of national and historic interest. Every member was presented with a copy of the ingenious and original guide book ("A London Symphony"), edited by Mr. Tudor Davies and Mr. Percy Good, as a preparation for their study of London.

The proceedings on Tuesday included a luncheon at the Savoy Hotel given by the Gas Light & Coke Company and the London electricity supply undertakings, at which the toast of "The International Illumination Congress" was proposed by Mr. George Lansbury, who, on behalf of H.M. Office of Works, had taken a very sympathetic interest in the work of the Congress and the floodlighting arrangements. An address of welcome was also delivered in English, French, and German by Lt.-Col. Kenelm Edgcumbe (chairman of the General Council of the Congress, who presided) and Mons. A. Filliol (Switzerland), hon. treasurer of the I.C.I., replied in English and French on behalf of the foreign delegates.

Following the luncheon there came what was undoubtedly the chief item of the London entertainments, namely, a river tour starting from Waterloo Bridge at 2.30 p.m., visiting Greenwich and returning by the Tower of London and Westminster by 10.30 p.m. This trip afforded an excellent opportunity of seeing the floodlighted buildings visible from the river and of witnessing the performances of *H.M.S. President* off the Embankment, *H.M.S. Scout* in the Pool of London, and the illuminated fire-floats off Hungerford Bridge. From 10.30 p.m. onwards a motor tour for the purpose of viewing other floodlighting installations, not visible from the River Thames, including the display of floodlighting with gas in St. James' Park and the super-illumination of Whitehall, had been arranged, but the enormous crowds which assembled and traffic congestion must have rendered progress almost impossible.

Floodlighting

Much has already appeared in the Press regarding the floodlighting arrangements, which fully justified expectations. The official list of buildings illuminated included Buckingham Palace, the clock tower at Westminster, County Hall, Horse Guards Buildings, National Gallery, Nelson's statue, St. Paul's Cathedral, Somerset House, the Tower Bridge, the Victoria Memorial, Westminster Abbey, and Westminster Cathedral, but numerous additions to this list have since been made. The illumination of the Houses of Parliament clock tower and Westminster Abbey perhaps struck the public imagination as much as any of the displays, whilst the floodlighting of Buckingham Palace was remarkable for its fine natural setting and for the scale on which operations were conducted, not less than 183 1,500-watt floodlight projectors being installed.

Some of these installations are illustrated on other pages of this issue and mention may be made of Thames House at Millbank (with its novel illuminated roof) and Somerset House, flooded with rose-coloured light, as particularly conspicuous examples. Whilst special efforts have been made to make the display in the vicinity of the River Thames a memorable one, the floodlighting is by no means confined to London. Actually there are over 50 towns and cities throughout the country where floodlighting installations are being staged.

During the evening of the second day of the Congress a banquet was arranged in the evening at the Dorchester Hotel, London, when the toast of "The International Illumination Congress" was proposed by Sir Hugo Hirst (chairman of the General Electric Co., Ltd.), supported by Mr. Henry Woodall (deputy governor of the Gas Light & Coke Co.); speeches were delivered by Prof. E. C. Crittenden (U.S.A.), Monsieur A. Filliol (Switzerland), and Herr E. Wissmann (Germany), on behalf of the foreign delegates. Following the banquet a motor tour of London's streets was planned for some of the guests, whilst others intended going to Croydon aerodrome, where a special display of night flying and landing had been arranged with interesting forms of landing lamps, wing-tip bracket flares, aerodrome illumination by a 10-kW floodlight, and the neon beacon.

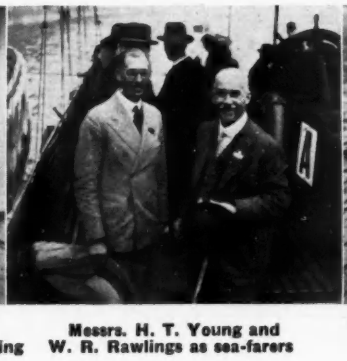
Acknowledgments

The illumination of buildings and cities has long been a familiar method of celebrating great occasions, but only in the past few years have the possibilities of floodlighting been realised. It does not invite comparison with natural lighting, for it does not seek to imitate it. When skilfully applied with or without colour it is capable of delighting the beholder with unsuspected beauties of architectural design and of endowing even austere structures of utility with the attributes of fairy palaces, as some of the permanent factory and stores installations in and around the metropolis testify on fair nights.

From 8.30 p.m. to midnight each evening throughout the month of September London will be seen in a new light.

Mr. Llewellyn B. Atkinson bids farewell to Mr. A. S. Markes

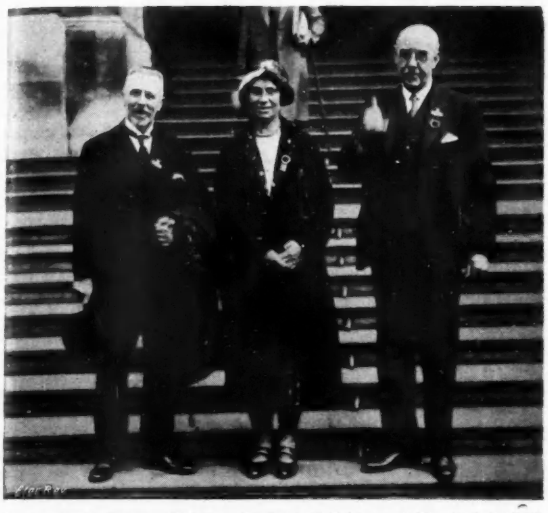
Mr. W. J. Jeffery and Ald. W. Walker discuss street lighting



Messrs. H. T. Young and W. R. Rawlings as sea-farers

The Rt. Hon. Geo. Lansbury, M.P., rests from his labours

Beauties hitherto hidden by darkness will be revealed by the elaborate system of floodlighting which has been installed and augmented street illumination will provide an enchanting spectacle, which will be as much a fresh delight to the



Mr. H. de le Paulle, Miss C. Haslett, C.B.E., and Mr. C. W. Sully

Londoner as to the visitor from abroad. We shall all discover a new London, and be the grateful debtors of the various lighting undertakings of the metropolis which are bearing the cost of the festival of light, namely:—

Electrical energy: London Electricity Supply Association.
Wires and cables: Cable Makers' Association.
Gas: Gas Light & Coke Co., also landscape lighting in St. James's Park and Whitehall street illumination.
Buckingham Palace and the Victoria Memorial: General Electric Co., Ltd., and Troughton & Young, Ltd.
Houses of Parliament clock tower: Holophane, Ltd., Siemens Electric Lamps & Supplies, Ltd., and T. Clarke & Co., Ltd.
County Hall: Siemens Electric Lamps and Supplies, Ltd., and Rashleigh Phipps & Co., Ltd.
Fire floats: the London Fire Brigade and Siemens Electric Lamps and Supplies, Ltd.
H.M.S. "Scout" and "President": the Admiralty and J. Mowlem & Co., Ltd.
H.M. Horse Guards' buildings and War Office towers: John I. Hall and Brown Bayley's steel works.
Incorporated Accountants' Hall: the Society, Belshaw & Co., Ltd., and Restlight, Ltd.
National Gallery, Nelson's statue, and St. Martin's Church: Strand Electric and Engineering Co., Ltd., and Stilmar Projection Lighting, Ltd.
St. Paul's Cathedral and St. Bride's Church spire: 26th Division of the London Territorials.
Somerset House: Edison Swan Electric Co., Ltd., and Cecil Cooper & Co., Ltd.
Tower Bridge: Bermondsey and Stepney Borough Councils.
Tower of London: Benjamin Electric, Ltd., and Anderson, Angell & Co.
Westminster Abbey: Holophane, Ltd., Siemens Electric Lamps and Supplies, Ltd., and Bell Bros. & Co. (London), Ltd.
Westminster Cathedral tower: Lewenz & Wilkinson, Ltd., Baxter & Caunter, Ltd., Norrington & Landon, Ltd.

A Representative Group of Congress Members

The Congress is being held in England for the first time since its inception in 1900. It has provided a special opportunity to show our visitors worthy examples of lighting technique as practised in Great Britain, many of which should be of permanent value as features of the buildings themselves, quite apart from their spectacular aspect.

Too often international conferences imply conflict of interests, clouds of doubt and suspicion; it is therefore a particular pleasure to record the doings of an international gathering the primary purpose of which is to work together for a common end. When that purpose is to determine how the world may be better lighted we can well believe that the results will be of benefit to all concerned. The gathering affords an unequalled opportunity to see at first hand the industrial and commercial applications of light in Great Britain, while the tour and the sessions of the Congress will afford contact with the leaders in lighting development in other countries.

Cambridge Session

Following the Congress more technical questions will be dealt with during the International Commission sessions at the University of Cambridge. That noted institution is a direct link between age-old traditions and classic culture on the one hand and the most modern scientific development on the other. A week spent in its ancient halls with wide-awake experts from all quarters of the globe should provide new points of view, a new approach to individual problems. New ideas are scarce and valuable; it is therefore worth while to seize such an opportunity for their generation.

On Thursday the Congress moved on from London to Glasgow and in due course, Edinburgh, Buxton, Sheffield, and

Mr. A. H. Stevens and Mr. S. H. B. Langlands accompany the Congress President, Mr. C. C. Paterson, O.B.E.

Birmingham will be visited, prior to the session of the International Illumination Commission on Illumination, which takes place in Cambridge from September 13th to 19th.

All photographs relating to the Congress appearing in this issue with the exception of fig. 3 on p. 347 and the one below (both due to the G.E.C., Ltd.) were taken by our own staff.

The Source of Light at Buckingham Palace

The Electric House

The writer discusses frankly five years' experience of electrical apparatus

By MANOR

MY first venture was electric light, and the change from gas has never been regretted. It is hardly necessary to enlarge on the superiority of electricity over gas as an illuminant; even the gas people will hardly dare to argue over this point.

Next, an iron was purchased. The advantage of heating the iron by electricity is overwhelming, and the cost, even when run off a lighting circuit, with current at 4d. or 5d. per kWh, is very small. I believe some people have an idea that the flexible lead gets in the way, that it breaks easily, and so on, but there seems no ground whatever for this idea. An iron of this type has been in use at the writer's house for some five years and has never given trouble. Just think of the hours saved during that time in having no trips to and from the gas range or fire, and the enormously lessened labour due to not having to carry a heavy iron several yards or feet many times in the course of the morning.

The Cooker; A Big Venture

The next addition was a very big one, namely, a full-size cooker. Before actually placing the order we endeavoured to work out the probable cost of running, and it is rather interesting to note that our estimate was surprisingly near to reality; in fact, we erred on the right side. After three years' constant use of her cooker my wife declares that she will never use any other method of cooking, and as the one who has to foot the bill I am equally satisfied, since I know from actual observation that this part of the household expenses is *less* than when we used gas for cooking. The cooker has given no trouble at all, except for minor details. There are so many different makes of cookers on the market, and the design has been so standardised (as a whole) during the last few years, that it is perhaps rather presumptious of me to criticise what is undoubtedly a really fine piece of work; but a large number of makers omit from their cookers features which seem to me to add enormously to their value. I shall no doubt be told that other people's tastes may differ from mine and, of course, I do not claim to speak for everybody; but surely the space between hob and oven, in many cases used only for grilling, should *always* be fitted with a door (as it *is* in many cases), and thus become a most useful hot cupboard.

Again, I am aware that there is a large difference of opinion as to the merits of top-and-bottom heating for the oven, or sides-and-bottom heating, and each type has its advocates; but is it generally realised that with the elements at the top and the bottom of the oven, *and on separate switches*, it is often possible, for small joints or milk puddings, to insert a baffle sheet at the desired height and thus reduce the oven to such small dimensions that the one element is ample to do the work? Very considerable saving can thus be made, and my wife has found this idea entirely successful, within its limit. With all the elements on one switch, this, of course, cannot be done. On the ordinary closed plate I think there is no doubt that, to boil a given quantity of water, a longer time is needed than with a good gas ring. I am aware that there are fast-boiling plates of the open type on the market, but they are as yet in the minority, and this is certainly a point—and about the only one—where the champions of gas present a reasonable-sounding argument.

I use the expression "reasonable-sounding" with intent; it may sound rather bad to be told that the electric hot plate takes three or four minutes longer to boil, say, two pints of water, than does the gas ring of comparable size, but in my opinion this consideration (even when the statement is true) does not, in practice, amount to a great deal. The extra time is not often noticeable, and the possible defect is counterbalanced many times over by the manifold advantages of the electric cooker over its gas rival.

There is one other point which the gas people try to make; that is, the necessity for heavy-gauge, flat-bottomed utensils for use with the electric hot plate. It is quite true that a light saucepan, for instance, takes a longer time to come to the boil than does a heavy one, and unless the bottom is perfectly flat the time taken and the current consumed increase rapidly (with a solid plate, that is, since the "open" plate, with a visible glow can, of course, be used with almost any utensil, as the heat transference does not depend on contact). But why not have the better utensils and make a good job of it? They may cost more than the flimsier utensils, but they will last far longer, and are therefore actually cheaper in the long run, besides being so much more economical in use. In our case a set of saucepans was obtained with the cooker, and although they have had three years' steady use they are practically as good as new.

A vacuum cleaner was obtained not long after the cooker. The choice of cleaner, whether "sledge" or "running" type, must depend on the individual taste. Personally, I prefer the latter; my wife and I have found that it is much less fatiguing to push a light cleaner about than to work the long tube of the "sledge" type, which has not only to be *pushed* to and fro, but *pressed* down on the carpet.

The Electric Kettle

An electric kettle is a good investment; besides being so very handy, seeing that it can be used in any room where a power plug is installed (or even off the lighting circuit, if not too heavily rated), it is much more economical in use, where a few pints of water are required, than the boiling plate. It will take, perhaps, one-tenth kWh to boil two pints in such a kettle, whereas with the hot plate more like 0.25 kWh is required, starting from a cold state. This, of course, does not apply so much when the operations are being carried out with the same plate immediately before or after the water is boiled; residual heat left in the plate can often be utilised after frying bacon or other operations, and the cost would then be much less. Where many lots of water are wanted in the day, or where the plate is not otherwise needed, it is therefore much cheaper to use the separate kettle. The kettle should have a safety device. The weight of an electric kettle, due to the element, is very deceptive, and there is a possibility of it being thought full of water when it is really empty; if the current is switched on under these circumstances, there is, of course, a large chance of the element being burned out before the mistake is discovered. Personally, I like the type of protective device which completely disconnects the kettle from the supply, in preference to that which switches the kettle on and off, as it heats up and cools. The great point is, that *all* these kettles (or other self-contained electrical water heaters) ought to have some such device.

A Water-heater "Snag"

I have had a 10-gallon water-heater in use for twelve months, and I have found the thermostatic control quite successful. The boon of hot water at any time with no trouble and no dust-raising fires is too obvious to need elaboration. There is one snag, however, which the prospective user should appreciate; the heat losses, when the tank is connected in the house supply, are much greater than is generally admitted by the makers. I reckoned on a heat loss of one kWh per day, but I found it was much larger than this. I was told when I complained that the smaller figure (which, I believe, is usually reckoned as the standard) only applied to the tank itself, and did not take into account the loss in the pipes. It seems to me to be a mistake to leave consumers to find this out for themselves, and I would suggest that it would be to the ultimate advantage of the suppliers to be quite frank over such points as these. Where local supply only is required (as over the scullery sink), this objection will lose much of its force.

As regards other "gadgets," we have found a small immersion heater very useful; ours is of the "ring" type and will boil half a pint of water in about two minutes. This is a great boon for such occasions as an early morning cup of tea, and is well worth the few shillings it cost. But beware how you use it for milk! This burns on in a most disconcerting manner. A tubular heater in the bathroom (permanently earthed) is used in the winter to keep the temperature above freezing. Designed to raise the temperature about 10 degrees, it costs very little to run, at 1d. per kWh, and it is a good insurance against frost.

In conclusion, I should like to put in a plea for better provision of power plugs when houses are being built. One rarely sees more than two or three power plugs put into the medium-priced house—one each in living room, best bedroom and kitchen is a usual arrangement—and only too often none are provided at all. If the desired increase in electrical appliances is to be attained, much better provision must be made; when a house is being built, it would only cost a few pounds extra to put at least one power point in every room, but after the house is occupied it is a different matter, as it generally means redecoration.

There seems to be greater need for collaboration between architect, builder, and electrical engineer, and I look forward to the time when the latter is as important a factor in the design of the house as any one.

Installing 132-kV Underground Cable

Some observations made during the laying and jointing of oil-filled cable on a Central Electricity Board contract

IN connection with the South Eastern district grid scheme of the Central Electricity Board a 132-kV three-phase main (three single-core cables) is at present being laid from the Croydon power station to Croham Heights, South Croydon, as part of the line from Croydon to Swanscombe. From Croham Heights outwards the transmission will be effected by overhead lines. During some hours spent in watching the unusual, particularly interesting, and somewhat intricate processes involved we were able to glean considerable information from the engineers on the job, and it will be convenient to take this opportunity to outline the procedure of installation.

For any installation the first move is to survey the route and plot the profile of the ground to some convenient scale—usually metres for convenience in calculating the oil pressures in the cable. At a point near the maximum height of the route an oil station (oil feeding point) is established. It is often difficult to secure sites for the oil stations, and as it is necessary that feeding points should be established before jointing operations can be commenced, temporary stations are often erected along the route at the time the cable is being installed. Proceeding down hill from the oil station the oil in the cable gains head, of course, and at the point where the oil pressure reaches the required limit—40 lb. per sq. in. is never exceeded—a second station is installed, a special stop

The Pull-in; Joint Bay at Pull-in End

joint being used on the cable at this point to arrest the oil head. At the joints between the stations the oil continuity is maintained. In the same way the positions of the other feeding points along the route are fixed. The number of oil stations on a route is decided by the gradients. On a flat profile stations can be as much apart as two miles, as far as the contractors have had need to try.

Cable Laying

Cable laying is started from any one or more of the feeding points. After the pull-in of a length, 220 yards (a drum with this length of cable of the size in question weighs 50 tons), the cable cannot be disconnected from the oil tank in the drum (ELECTRICAL REVIEW, August 14th, 1931, p. 237) until it is connected to the oil station at the far end. After the second and subsequent lengths of cable are pulled in with the required over-lap the two ends are connected up by lead pipe between the nipples on the ends of the cable, the plugs being removed. There are usually two nipples on each end cap, which provide for changing the connecting pipes from long to short connections, and also enable the cables to be cross-connected during jointing.

The cables are laid in inverted triangular formation, a third of a "twist" being given to the triangle every 220 yards. If there are two feeders in one trench they are laid at 18-in. centres. The normal excavation is 3 ft. 8 in. deep in paths and 4 ft. 2 in. in roads. In rough ground 3 in. of riddled earth is placed in the bottom of the trench before the first cable is laid. Filling in is then done with riddled earth to the top of the bottom cable and the other cables are laid over the first one with half over-laps. To maintain the triangular formation the cables are held together at every four feet by special zinc

In a Joint Bay; Oil Connections between Cables for Maintenance of Flow during Jointing, &c.

straps secured on the tongue and eye principle. The cables are then covered with 3 in. of riddled earth, and finally, before the trench is filled in, with 11-in. wide concrete slabs. At the end of each cable length, before laying, a joint bay 36 ft. long and, for a single feeder, 4 ft. wide—the depth, about 6 ft., varying according to obstructions—is constructed. In the bottom of the bay three concrete pads, each the full width of the bay and 9 ft. 6 in. long, are put down as foundations for the joints.

Jointing Processes

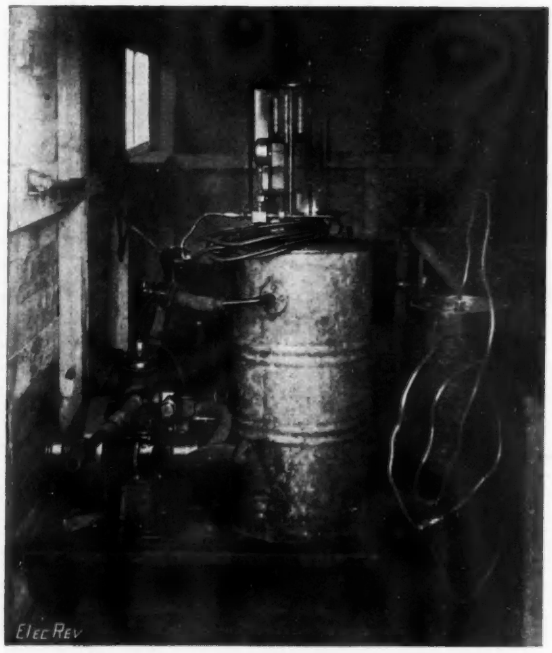
When the cable is cut for jointing the oil is kept flowing full-bore. After necessary trimming back of the lead, paper, &c., the central hollow spiral is "wound back" by a special key to permit the insertion of a hollow steel pin of the same diameter as the spiral and carrying a collar the same diameter as the conductor, so that with the collars of the two pins (butting one in each cable end) a uniform conductor surface is presented. To restrict the oil flow until the two ends are butted, a fibre plug is inserted in each steel pin.

A novel feature of the actual conductor joint is the absence of sweating. A hollow copper ferrule is placed over the joint, and the cable conductors are compressed hydraulically between

Straight-through Joints Before Enclosure in Coffins

the ferrule and the steel pin. A small hand oil pump and a suitable hydraulic press are part of the jointers kit. Each recess in the ferrule made by the press is filled in with a phosphor-bronze ring so as again to present a uniform cylindrical conductor.

Insulation is now applied until there is a perfectly cylindrical bearing right across the joint, when paper is wound round



De-gasifying Unit in Temporary Oil Station; Drum Tank on Right

the joint by a machine. The papering machine has two bushes, one clamped at each end of the lead sheathing, around which flanges with suitable ties and carrying two rods charged with rolls of paper, and also handles, revolve. The rods are equidistant around the cable, and one carries 32 rolls of paper and the other 31 to provide for over-lapping. The rods are equipped with spring tensioning arrangements, so that the tightness of the paper on the cable can be controlled. As the machine is revolved the end rolls are gradually and progressively disconnected, so that the insulation is stepped up in conical fashion to a maximum overall diameter of about $5\frac{5}{16}$ in. in the centre. The insulation is then pared down to fit aluminium bells which cover the paper and serve to grade off the electrical stresses, the ends of the lead sheaths being belled out to accommodate the ends of the aluminium bells. Overall are placed a copper sleeve and two end pieces, involving four plumbing wipes. The sleeve is fitted with nipples at the top and bottom which serve for the necessary connections during evacuation and impregnation of the completed joint. The joint is heated by an electrical jacket before evacuation, and during the latter process periodical tests are taken for leakage. After evacuation the joint is filled with oil through the bottom nipple, the oil being allowed to flow through the joint and the top nipple into the de-gasifier. After sealing off the joint is left for a week's inspection before it is assembled in its concrete "coffin" and buried. The coffin is fitted with clamping arrangements at the ends with tension rods running right through the interior to prevent strain on the box. During the jointing processes the cables are so interconnected and looped that the oil flows to the joint from both ends, *i.e.*, with oil pressure on either side of the joint. The average time taken to complete a straight-through joint is 22 hours, continuous working.

The stop joints used at the sectionalising points of the oil circuits are made practically wholly at the works, so that the assembly on site is a comparative simple matter. The joint consists essentially of a cylindrical oil-filled tank containing two porcelain insulators which fit over the cable ends and which are connected at the joint centre by a flexible coupling. To assist the distribution of the electric field a metal shield screens the end caps of the insulators. The shell is paper insulated. The cable ends are insulated in the field, provided with electrostatic control, fitted with specially designed spring contact plugs, and then slipped inside the insulators so that their connectors engage with the contact caps. Each cable end is impregnated under vacuum. The oil in the tank is connected to the side of the line at the higher pressure to take care of the changes in volume due to temperature variation; thus the porcelain is always subject to compression.

For cable-end sealing a special terminal is used—manufactured at the works and assembled on site. The insulation of the cable at the end of the lead sheath is reinforced by a paper roll and fitted with a shield for electrostatic control, and the inner lead of the cable is plumbed to the bottom section of the base casting. A ferrule at the top of the terminal connects the oil passage in the cable with the interior of the terminal. The terminal is impregnated under vacuum and finally covered at the top by a shield.

Oil-feeding Equipment

In the oil stations are used two types of supply tanks—feed and pressure tanks. A feed tank consists of a series of cells each having an elastic diaphragm which expands and contracts readily with the expansion and contraction of the oil. The cells are joined by a manifold which is connected to the stop joint. The size and number of the tanks is decided by the length of line to be served.

A pressure tank is a casting containing a number of cells filled with gas. When the cable heats up and the oil expands, the pressure at the lower end of the cable, to which the pressure tank is connected, and which may become temporarily excessive due to the head of oil, is relieved by the cells. The tank thus acts as a sort of balancing apparatus during the time lag between the development of the pressure at the low cable end and the correct presentation at the top.

The cables are connected up to pressure tanks during jointing work, when the pumps are kept under way to maintain the pressure in the cables. A petrol-motor driven pump evacuates a glass container and draws oil through a heated coil. The oil flows up through a central column of the glass chamber of the degasifier and outward between metal disks in the form of films, so that gas contained in the oil is expelled in the evacuated vessel. A small hand pump is used for conveying the oil from the glass container. At the top of the container is a connection for a manometer. CO_2 cylinders are kept at hand, and this gas is used for blowing out the oil pipes, &c., and also the joints before impregnation; CO_2 is soluble in oil.

The essential precautions during the handling of oil-filled cable are: always fill under vacuum; always make connections under oil pressure.

International Electrical Congress

To mark the fiftieth anniversary of the first International Electrical Congress held in 1881, arrangements are in hand for the holding of an International Electrical Congress in Paris during the course of next year. The proceedings of the Congress will be divided into ten sections. Full particulars can be obtained from the Comité d'Organisation, 134, Boulevard Haussmann, Paris.

Feed Tanks (Left) and Pressure Tanks (Rear) in Temporary Oil Station

The Effects of Unbalanced Voltage.

By E. V. Clark, B.Sc.

The nature and cause of errors in metering due to the use of single-phase meters for the measurement of three-phase energy

IT is well known that if a three-phase induction motor is running under moderate load and one fuse is removed, the motor continues to run in single-phase fashion, and that, owing to the revolving flux, the terminal connected to the empty fuse block will be found to be at nearly the same pressure as when the fuse was intact. This, of course, is the basis of the Ferraris-Arno method of using three-phase motors in a factory supplied with single-phase current.

A natural deduction from these facts that is not so widely known is that if a three-phase motor is supplied from mains in which the voltage triangle is not truly symmetrical, then, as the three-phase back e.m.f. produced by the revolving flux is almost exactly equilateral, the current and power taken from the three lines may differ very materially.

This fact was brought home to me recently when I was asked whether the method of metering the power to a three-phase motor by means of a single-phase meter, with its series coil in one lead and its pressure coil thence to the star point, was accurate, when the meter reading was multiplied by three. A firm installed a refrigerating plant driven by a 1½-b.h.p., 415-V, three-phase motor; the supply company having no three-phase or 415-V single-phase meters in stock, and considering that the cost of three meters would not be warranted, installed a single-phase meter in the manner above described, except that the free end of the pressure coil was connected solidly to "earth," since the star point of the motor was not available and use of the neutral lighting wire would cause the meter to be inoperative whenever the lighting main switch was open.

Over-registration of Single-phase Meter

At the outset the refrigerator, whether from stiffness of bearings, &c., or from faulty metering, consumed more power than its purchaser had expected. When the head of the firm was told by a visiting engineer, with the little learning that Pope says is so dangerous, that the multiplying factor for a single-phase meter used on a three-phase supply should be 1.73 and not 3, he concluded that he had been overcharged.

The supply company thereupon removed the single-phase meter, and put in a three-phase one. After this had been in use for some months the power indicated by the new meter was found to be consistently less than had been recorded by the single-phase meter for the corresponding months of the previous year—possibly because the later summer was somewhat cooler than the earlier one, and the general depression had affected the number of visitors, or, alternatively, because the single-phase meter had over-registered.

Obviously, with a single-phase meter connected as described upon a circuit of balanced voltage supplying a balanced load, the proper multiplying factor is three, as used by the company. But unbalance of voltage is usually the result of unequal current in the three mains; and it so happens that on the company's system balance is exceedingly hard to maintain, a disturbing factor being a considerable number of large houses, owned by city families who run down with house parties for occasional weeks or week-ends. Indeed, such is the abnormal nature of the load that the station peak comes at the height of the summer.

Magnitude of Errors

Laboratory tests were made to ascertain to what extent unbalance of voltage might affect the relative amount of the power taken from the three supply mains by a normal induction motor, in order to determine whether the apparently high power readings, as obtained from the single-phase meter, could possibly be due to one wire of the supply being generally higher or lower in voltage, with respect to "earth," than the other two.

An auto-transformer was inserted in one leg of a small star-connected alternator, so that the voltage in the leg could be boosted or bucked by a few per cent. Leads were run thence to an induction motor, in each phase of which a wattmeter was inserted, the pressure coils being united together and to the star point of the alternator.

It was at once found that small differences in voltage made much larger differences in the watts taken from each phase; as might be expected, these differences were greatest at light load. Indeed, when running the motor light with one phase bucked 8 per cent. below normal, it was found that the whole power was taken from a single lead and that the wattmeters on the other two read zero or a negative.

A second noticeable point was that by boosting the voltage in one line, the reading of the meter in this and one other line at once increased somewhat in reading, while the reading of the third meter fell to a marked extent; similarly, if one voltage was lowered, the readings of two meters fell, while that of the third increased.

The table below gives typical figures for tests on a star-wound 2-b.h.p. induction motor. Tests on a 5-b.h.p. delta-connected motor gave figures of a similar nature.

Load on Motor.	Volts, Line to Star.			Variation per cent.	Watts from Mains.			Max., Mean.
	A.	B.	C.		A.	B.	C.	
Light ...	94	90	94	4½	170	30	40	2.13
About 1/4 ...	94	86	94	8½	460	190	220	1.59
About 2/3 ...	92	86	93	7½	870	540	600	1.30
About 5/6 ...	91	84	91	7½	1,050	710	780	1.24

From the figures of this table it is evident that the use of a single-phase meter, connected from line to star point, is liable to considerable errors when connected to a circuit containing induction motors, if by use of single-phase apparatus outside the meter circuit or from some other cause the voltage triangle is slightly distorted. The use of such a meter for the sale of power, as in the case cited, is probably extremely rare, but, for recording or indicating the power taken by an individual motor, it might be adopted for cheapness when extreme accuracy was not important.

Effect of Other Single-phase Supplies

A variation of voltage of 8 per cent. between the legs is, of course, extremely improbable in any normal light and power supply; but differences of some 2 per cent. are not impossible in works where single-phase apparatus such as arc welders are in use. This difference would cause errors in single-phase metering varying from, say, 5 per cent. at full load to 30 per cent. when running light, errors being positive or negative according to the nature of the voltage distortion relative to the line in which the meter was inserted. Owing to their higher efficiency, and therefore nearer approach of back e.m.f. to line pressure, large motors would be more susceptible to voltage dissymmetry than small ones.

In the rare case of a supply authority metering three-phase power to a motor by a single-phase meter, as in this instance, one would expect in general that errors would largely average out over any lengthy period, for, naturally, any persistent want of balance in the voltage must be due either to a faulty connection, such as a wrong transformer tap, a bad connection in a line, or to a serious unbalance in house connections, any of which is likely to be soon observed and remedied. It is where unbalance is due to excess load on one phase to-day, and on another to-morrow, that its correction becomes impossible, as this would cause the meter to run now fast, now slow. It is therefore with an indicating wattmeter that there would be most likelihood of serious error, and it is probably with indicating wattmeters that there is most chance of the method being used.

In carrying out the above tests, no comparative measurements of currents in the three phases were made, but presumably their differences would be much of the same order as the differences in power. One may therefore conclude that in general the use of a single ammeter in the circuit of a three-phase motor is reasonable practice, since, as a rule, one desires rather an indication of the order of the current than a high degree of accuracy, and error at time of full load is not likely to exceed 5 per cent. or so.

Determination of Power Factor

One fact, however, stands out that is worthy of some consideration, *viz.*, the determination of power factor of an induction motor, particularly at light load. Ordinarily, one computes this in one or both of two ways: (1) by measuring the power taken by the usual two-wattmeter method, and using the formula $\tan\phi = \sqrt{3}(W_1 - W_2)/(W_1 + W_2)$; or (2) by measuring current and volts as well, when $\cos\phi = (W_1 + W_2)/\sqrt{3}\,E\,I$. The first of these rules is admittedly only accurate with balanced loads, and the second is also faulty in conditions of unbalance if current in a single lead only is read. Nevertheless, it is usual to assume that a properly-designed induction motor gives a balanced load, and that therefore either method of computing power factor will give a reasonably correct result. It is quite evident, however, from these tests that this conclusion is only sound if the motor is tested on a circuit of balanced voltage, and measurements of the power factor of polyphase motors running light are valueless, unless current is measured in each phase, since a degree of dissymmetry in the voltage triangle too small to be noticed may produce appreciable unbalance in the currents taken from the three mains.

Encouraging Domestic Electrification in France

The Compagnie Parisienne's New Tariff

AS long ago as 1923, with the object of encouraging the use of both electric lighting and heating, cooking, and other appliances in households the Compagnie Parisienne de Distribution d'Electricité introduced a special low mixed tariff, which, except as regards detail changes, has since remained in force. As a result, however, of the great increase in the use of electric power for domestic purposes, the Compagnie, after careful study and inquiries has recently introduced an entirely new basis of supply charges, details of which are given by M. L. Chereau, the chief of the inspection department of the company, in the course of an article in a recent issue of the *Revue Générale de l'Electricité*.

Under the old tariff, which has lately been replaced, a user's annual consumption, through a single system of wiring and one meter, was divided into three parts, the first of which, taken as representing the lighting consumption, being charged at the usual lighting tariff. The two other parts were entered as "other uses," the first being charged at the standard "other use" price and the third at one-third of the usual scale. The current standard charges in the company's area are 1.7649 fr. per kWh for lighting and 1.030 fr. for "other uses."

So long as the use of domestic electrical appliances was relatively small, the tariff gave general satisfaction. The appended table gives a comparison of the domestic, *i.e.*, non-commercial, clientèle of the company and its consumption under the standard and "mixed" tariffs during 1930, from which it will be seen that under the "mixed" tariff, the average consumption is practically double that supplied under the standard rate.

	Standard tariff	"Mixed" tariff
Number of consumers	484,400	63,500
Total load, kW	251,300	53,900
Average kW load per consumer ...	0.52	0.85
Consumption in 1,000 kWh	70,184	18,175
Average annual kWh per consumer ...	145	286
Average hours of use per year	279	337

Basis of the New Charge

As a result of the increasing use of radiators, stoves, and other electrical appliances, consumers, owing to two-thirds of the consumption being charged at full rates, began to find their electrical bills going up, and while some of them discovered that they could economise by having a second circuit put in to take advantage of the company's alternative scheme of separate tariffs for night and day supply, in numerous instances any idea of extending the use of electric power was given up. Experience having demonstrated that the mixed tariff was mainly used by tenants of medium and large flats, rather than of individual houses and small flats, is was finally decided that a tariff based on the number of rooms would prove the most satisfactory. The next step was to decide on what might be regarded as a "room," the final decision being to take the actual number of living rooms and to regard the supplementary parts of a house or flat such as entrance, kitchen, bathroom, and lavatory as one room. After examining about 27,000 residences, it was resolved that the old method of dividing the cost of supply into three charges should be maintained, but that for any house or flat there should be annual fixed quantities regarded as coming under the lighting and "other use" rates, all power consumed over and above these quantities being chargeable at one-third of the "other use" tariff.

The fixed annual quantities decided upon under the lighting and "other use" tariffs are as follows:—

New "mixed" tariff

No. of rooms	Quantity chargeable at lighting rate	Quantity chargeable at "other use" rate
1	70 kWh	35 kWh
2	100 "	50 "
3	130 "	65 "
4	160 "	80 "
5	200 "	100 "
6	240 "	120 "
7	300 "	150 "
above 7 add for each room	80 "	40 "

Effect on Peak Load

Some fears were at first entertained that the introduction of a scheme embodying a reduction of two-thirds in the rate charged for any excess consumption over the annual scheduled totals would increase the distributing company's difficulties at the peak hours in winter. As a result of investigation it was found that the only likelihood of this occurring was in respect of the use of electric fires and radiators. So far as lighting is concerned, there is no risk of increased load, while the majority of domestic appliances, such as vacuum cleaners and electric irons, are used at other than peak hours, electric cookers, except in rare cases, being also more used during the day than at night. As for electric water heaters, these are mainly used in the mornings for toilet purposes and, even when fitted with automatic switching in and out devices, are rarely using current at night.

With the object of preventing any excessive load by the use of electric fires at night, the new "mixed" tariff sets a limit to the load that may be put on the house or flat circuit, the limit being such that it excludes the use of living and sleeping room heating appliances. Where heating equipment is desired, an alternative tariff, under which, while fires and stoves may be operated off the one system of wiring, a triple-recording meter is used, the whole of the power consumed being at first charged up at the "other use" rate, an addition then being made thereto of the difference between the lighting and "other use" rates on the scheduled fixed annual lighting consumption corresponding to the number of rooms in the house or flat.

Under the new scheme, which has been in successful operation in Amsterdam for some years, a consumer has the advantage of knowing what his annual bill for lighting, and for a certain quantity of "other use" current, will amount to, and that unlimited additional power will cost him, approximately only 34 centimes or 0.68d. per kWh. On its part the Compagnie Parisienne anticipates that it will lead to a considerable expansion in the use of domestic electrical appliances in the French capital.

A Historical Survey

Electrical engineers desirous of obtaining particulars relating to our industry for the past half century may be reminded of the well-produced publication issued by Messrs. Crompton Parkinson & Co., Ltd., in commemoration of the jubilee of the foundation of the firm in 1878 by Col. R. E. Crompton.

The excellent reproductions of illustrations of some of the pioneer machines are particularly interesting, but even more noteworthy are those of the early forms of cooking apparatus, examples of which were shown by Col. Crompton and Mr. Dowsing at the Crystal Palace Exhibition in 1931.

H.M.S. "President," with Somerset House in the background and the I.E.E. Building on the extreme left

Freight

A factor in export trade which deserves close study

[From a Commercial Correspondent]

THE up-to-date executive who may be called upon to deal with correspondence and inquiries from all quarters of the globe requires to be well informed upon the broad aspects of shipping and freights. The day is undoubtedly passing—at any rate in the majority of trades—when in reply alike to inquiries from distant countries such as Australia, or from markets nearer home such as Spain, a manufacturer could quote a price delivered at his own works "packing and all charges extra," and leave it to his inquirer to imagine exactly what such varied charges as packing, carriage to shipping port, freight, insurance, and similar charges were going to cost. The increasing keenness of competition is demanding in many trades that prices shall be calculated upon a c.i.f. basis and quotations made in the customer's language and currency. In its turn, this trend is showing the need for a greater diffusion of knowledge of freights and shipping matters generally on the part of all concerned with the vital question of export trade.

The subject is of particular importance in the daily work of an establishment where c.i.f. quotations are the rule rather than the rare exception, but a general knowledge of freights and shipping matters generally is a valuable aid for any sales engineer, even though he may not be called upon to undertake the actual routine of shipping. The compilation of the simplest c.i.f. quotation involves a knowledge of freight rates and their method of calculation, the cheapest and best routes, the style of packing necessary for a given class of traffic, and similar matters.

Calculations

In order to arrive at an estimate of the freight payable upon any piece of electrical machinery it is necessary to know first of all the actual packed weight of the goods to be shipped, and the outside measurements of the container. Such data are fundamental, and it cannot be too strongly enjoined upon everyone who is called upon in any way to assist in the compilation of a catalogue to see that such particulars are fully and correctly given in respect of every piece of apparatus described. Assuming that an inquiry is being handled for certain electrical plant for the Pernambuco district, a quotation of freight rates is first obtained from the shipping agents, which will probably read:

"From f.o.b. Liverpool to Pernambuco, up to 2 tons, 80s. 0d. per ton; above 2 and up to 3 tons, 85s. 0d. W/M."

The last symbol is a contraction for "weight or measurement at ship's option." In other words, the shipping company reserves the right to pick out packages whose bulk is large in comparison with the weight, and to charge these on the basis of a measurement of 40 cu. ft. being equivalent to 1 ton. Taking for example a couple of cases of electrical machinery, the freight upon these would be worked out as follows:—

Package	Cu. ft.	Weight	Rate	Freight per ton
5 ft.×2 ft.×2 ft.	20	30 cwt.	80s.	£6 0 0
5 ft.×4 ft.×4 ft.	80	45 cwt.	85s.	8 10 0

It will be seen from the above that a package possessing normal dimensions and weight is charged for upon the weight rate, but the second (which measures 80 cu. ft. against a weight of only 45 cwt.) is on this measurement basis assessed at 2 tons and charged accordingly.

Rates

Rates of freight vary considerably, not only according to the port of destination, but according to the class of goods, so that when applying to a shipping agent for a quotation of freight rates the inquirer should always be careful to name the traffic or class of goods in question, as this factor affects the rate considerably. Although the rates of freight for a given class of goods vary with the destination, this variation is by no means in proportion to the distance; for instance, when the rate of freight upon machinery to Vigo in the north of Spain was 50s. per ton, the rate to Lisbon which is a longer distance, was only 35s., while to Calcutta the figure was 45s. per ton.

Records

The executive who wishes to make a study of this interesting and important subject should see that all freight rates quoted, all c.i.f. quotations compiled, and all freight accounts received are systematically recorded and analysed. It is occasionally possible to secure from some of the more up-to-date shipping agents a list of the freight rates upon a particular class of goods to all the main ports in the world, at any rate for lifts up to 2 tons, but it is quite exceptional for a manufacturer to be able to secure complete information of this description. In the vast majority of cases, shipping agents confine themselves to quoting a rate to a specific port against a definite inquiry, mentioning the class of goods to be shipped and the shipping measurements.

The rates quoted for insurance should also be noted. Such rates are fairly stable, but in any case when compared with freight rates even a considerable variation in the insurance premium is not likely to affect materially a c.i.f. figure as it rarely exceeds 10s. per £100. Although insurance rates are so low, it is possible when a firm is shipping considerable quantities to effect some striking savings in the insurance premiums by looking sharply into rates, but for anyone whose shipments consist merely of £200 or £300 per month there is no need to spend much time over seeking a fine-cut rate for insurance.

Incidence of Freight

Apart from the value of an up-to-date register of freight rates to various ports in the world in facilitating calculations, without the necessity for continual inquiries and correspondence with shipping agents over every trifling quotation that has to be made, it is of great assistance if such a register is amplified so as to record the exact effect that a given freight charge per ton has upon the landed cost of a manufacturer's goods. To this end it is first of all necessary to know the average selling price of the goods per ton. This is a matter that requires a little careful study, but in spite of its apparent difficulty it is usually possible with a little care to arrive at a figure that covers all cases, or else to fix average figures by dividing the productions into classes. By the help of this information it is possible to shorten considerably the calculation of freight, especially upon shipments consisting of large numbers of very small articles, such as would be represented by an order for various tools. Although the method already described is the normal means of calculating freight upon consignments of large goods whose measurements are known and recorded, it will be realised by all who have attempted it how great is the loss of time involved in estimating the weight, measurements and freight payable upon a consignment consisting of hundreds of small articles such as a supply of tools for some overseas works or foundry. For such goods, it is usually possible to work upon an average price per ton, and from the total price to obtain a very close indication of the total weight.

Goods and Value (a)		Destination	Packing	Freight	Insurance	Sundry charges	Percentage on (a)
House lighting set, with accumulators	£275	Rotterdam	£23 0 0	£7 10 0	£1 3 0	£0 6 0	3
Small generating set	£120	Bilbao	4 10 0	7 15 0	1 8 0	0 13 0	8
Five-h.p. engine	£50	Madras	2 0 0	1 13 0	0 6 0	0 9 0	4.8

A Useful Method of Recording Shipping Charges

Freight calculations are also considerably facilitated by the possession of records of past shipments or of past calculations arranged to show the freight charge to different destinations in the form of an overall percentage upon the home selling price, somewhat on the lines indicated by the example given in the above table.

The analysis of shipments in this way will result in a quickness in estimating freight charges which is astonishing to anyone who has not tackled the subject upon these lines, but has been accustomed to the more orthodox but slower method of working out weights and measurements in detail, and a little investigation of this kind will usually show that far from being the laborious and risky calculation that it is usually assumed to be a c.i.f. quotation is no more difficult to prepare than any other.

The German Radio Exhibition

Complete short-wave transmitting and receiving sets, improved loud-speakers, and an average price-cut of 25 per cent. are the features of the annual German Radio Exhibition which opened in Berlin on August 21st. The exhibition, which is claimed to be the largest of its kind in Europe, is housed in eight large halls surrounding the famous Witzleben wireless tower. Makers of talking-picture apparatus are amongst the 325 firms which, despite the financial and economic crisis, have exhibits at the show. There is a large array of radio-gramophones, ranging from luxurious sets incorporating moving-coil speakers, to the less pretentious types.—*Reuter* (Berlin).

The Curing of Tobacco by Electricity

The results of an investigation have been sufficiently encouraging to justify the continuance of the tests through another season

WITH a view to testing the possibilities of substituting electricity for wood fuel in the curing of tobacco, the State Electricity Commission of Victoria, Australia, agreed to provide an experimental kiln provided that the growers would supply the leaf and necessary labour for handling it. Messrs. Fisher & Sons, of Wangaratta East, volunteered their co-operation, and made themselves responsible for personal assistance and the provision and delivery of the green leaf for treatment.

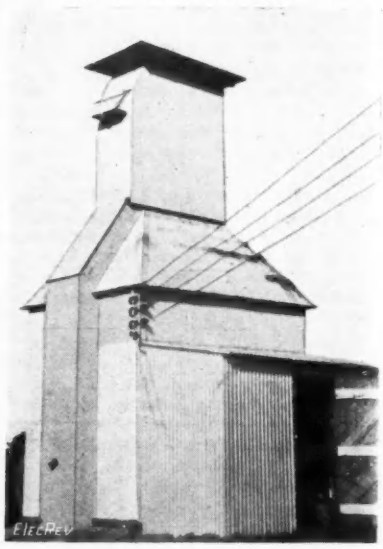
It was decided to construct a kiln capable of handling roughly a quarter the capacity of a standard-sized kiln. By kind permission of the directors of the Wangaratta Woollen Mills a site was provided on their property adjacent to an existing sub-station, and a 12 ft. by 8 ft. three-tier (later altered to four) kiln was built of 4 in. studs lined inside and out with fibro-cement sheets, and the intervening 4 in. space filled with cow chaff. The roof was of galvanised iron, but lined inside, and with similar 4 in. insulation. The usual top and bottom hinged board vents were provided and a lean-to shed for the testing instruments and stores. Three inspection windows were provided, so that the leaf in each tier could be examined at every stage of the process. It was further decided not to depart far from the orthodox method of curing for the initial tests, but to alter the method by a process of gradual evolution as required by the results obtained. Thus in the first test the only departure made from the usual method was to substitute electrically heated tubes for the flues and place them under each tier and row, instead of all on the floor. Nine 7 ft. heating tubes (kindly lent by Hecla Electrics Pty., Ltd.) which could be plugged in, three under each tier of leaf, were installed. Provision was made for the temperature of each set of three tubes per tier to be independently controlled. Additional heaters were provided on the floor for drying purposes only.

The Tests

The kiln was first filled on April 10th, when 93 sticks of leaf were treated. During the first thirty hours a general temperature of between 80 deg. and 90 deg. F. was maintained, and to secure high humidity steam (generated electrically) was supplied continually. Drying was completed in five and a half days, or one day less than in the flue heated barns at that time. Messrs. Fisher reported that the grade was at least equal to that being obtained in their own barns at the time; it was slightly more uniform and certainly quicker dried.

The kiln was refilled on April 20th, with the same quantity of leaf. The same arrangement of heating tubes was retained, but automatic thermostatic control was installed. The electrical thermostats were of "Satchwell" make kindly lent by Messrs. H. Rowe & Co. The drying occupied about the same period, and Messrs. Fisher reported that the grade was better than in their own kilns; while still not uniform, it was more so than they were getting, and a general improvement had been made. A mere inspection night and morning was all the attention necessary.

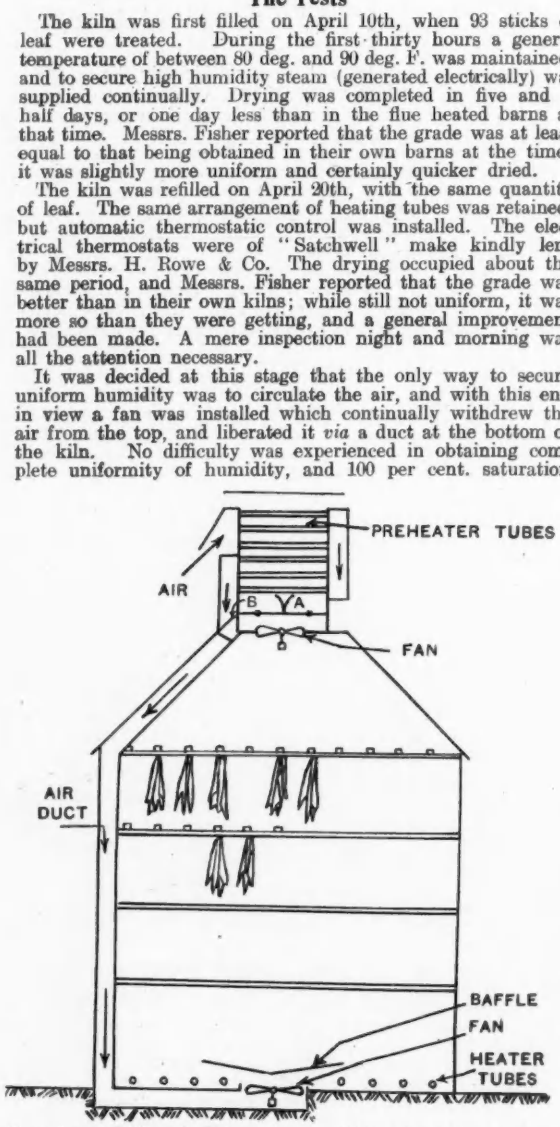
It was decided at this stage that the only way to secure uniform humidity was to circulate the air, and with this end in view a fan was installed which continually withdrew the air from the top, and liberated it *via* a duct at the bottom of the kiln. No difficulty was experienced in obtaining complete uniformity of humidity, and 100 per cent. saturation was reached in the bottom rows. The kiln was filled on April 28th, and dried out in rather under five days, or a day and a half less than in the flue heated kilns, cold and dewy nights being experienced at the time. A temperature as high as 200 deg. F. was applied to complete the drying. Messrs. Fisher reported that the sample was still better, the bottom rows being practically equal to those at the top. There was hardly any evidence of "sponging back," and a very bright sample for that period of the season was obtained.



Arrangement of Test Kiln for Final Test

The preceding tests had proved so encouraging that it was decided to experiment with some leaf of unknown variety but of proved bad curing characteristics. It was also decided to increase the capacity of the kiln by closer spacing of the tiers, adding a fourth and accommodating 128 sticks. The result was a very uneven sample—not as between top and bottom rows—but of the leaves themselves on the same stick. In view of the difficulties Messrs. Fisher had met with in curing that variety, they regarded the results as satisfactory.

It was noticed during the previous test that moist cold air was being introduced, and the drying effect thereby lessened, as sudden gusts of cold wind caused a fluctuation in temperature immediately above the ducts. It was decided, therefore, to draw the inlet air from some distance above the ground. At the same time, it was thought that portion of the heat of the out-going air could be transferred to the inlet air, thereby avoiding any possibility of a chilling effect on the lower tier of leaf. When curing, the doors of the ventilators are as shown, but when drying flap A is opened and flap B altered to the position shown by the dotted outline. The tubular heaters originally placed under the top and intermediate rows were removed, as during the curing process the circulation of air ensured uniform temperature. All the heat was concentrated on the floor level, though had there been time for the alteration the heaters would have been placed in a suitable position in the duct. The kiln was filled on May 14th, and the drying finished on May 19th, the whole period being very wet, cold and windy. Had it not been for the preheated air at least two days longer would have been required.



Experimental Electric Tobacco-curing Kiln; Preheater at Top

Consumption of Electricity

A test of the experimental kiln was made to determine how nearly the actual consumption of electricity would correspond with that calculated. The capacity was 1,750 lb. of green leaf:—

Heat required to raise temperature of kiln and contents approx.	735,000 B.th.u.
Heat content of 28,200 lb. of air necessary to evaporate the 1,520 lb. of moisture in the leaf	2,100,000 B.th.u.
Heat lost through walls and roof 658 sq. ft. at 11.6 B.th.u. per sq. ft. per 24 hours per 1 deg. difference	2,100,000 B.th.u.
Total	4,935,000 B.th.u.

This is equivalent to 1,450 kWh, whereas the actual consumption was 1,456 kWh. The consumption would not increase directly with the capacity of a kiln, which to hold four times the quantity would have a wall area (and wall losses) only twice as great as above shown. The consumption of 5.6 kWh per lb. of dry leaf is not indicative of what may eventually be accomplished under average seasonal conditions, full scale operation, reduced wall losses, and regenerative methods of heating. It is thought that an average consumption as low as 3 kWh per lb. will be reached.

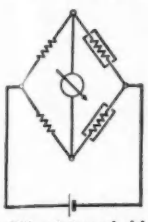
The investigation has shown that certain definite advantages and improvements in the curing of tobacco may be attributed to the electrical method: the fire risk is reduced to the minimum; there is no possible chance of taint from flue gases; the aroma of the dried leaf is noticeably stronger; the drying can be speeded up without the use of excessive temperatures; the minimum of attention is needed; loss of quality due to "sponging back" can be entirely eliminated; the colour is brighter; and the grade is more uniform.

Alternator Protection. By D. A. Bower

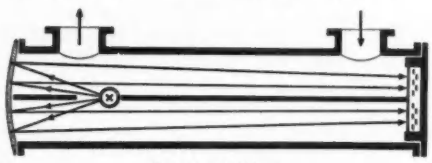
The Buchholz system is claimed to detect all classes of faults in their incipient stages

THE various systems of alternator protection in general use at the present time are susceptible only to electrical influence. Their response to fault conditions is thus delayed until the insulation has deteriorated sufficiently to cause disturbance of normal electrical conditions in the machine itself and in the supply system.

Such electrical disturbances are invariably preceded by progressive disintegration of the insulating material and this fact provides a means of detecting all classes of faults in their initial and incipient stages. A protective system which is influenced by the products of decomposed insulation fulfils this desideratum, as it is inherently capable of detecting abnormal conditions which might otherwise remain imperceptible until the occurrence of a serious breakdown. This principle of fault detection is used in the Buchholz system of alternator protection.



Wheatstone-bridge Connections



Sectional View

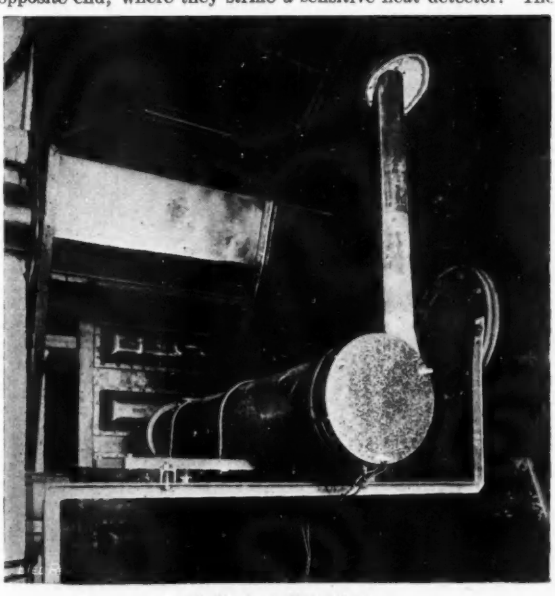
Principle of Operation

The relay consists essentially of a detector, which is sensitive to the presence of minute particles of decomposed insulation in the air passing through the machine. These particles are liberated from any point on the winding where abnormal heating is taking place, and they present all the characteristic properties of decomposed organic bodies, *e.g.*, hydrogen, hydrocarbons, oxides of carbon, and pure carbon. As a result of experiments to discover the most sensitive means of detecting the products of decomposition, the method decided upon as the most sensitive and certain in operation is based on the interception of heat rays by the decomposed particles.

The detector is placed in the exhaust air circuit of the alternator. It consists essentially of a cylindrical tube, divided by a central longitudinal partition into two compartments. The upper chamber is used as a standard of comparison and the lower one is traversed by a small proportion of air which is temporarily deflected from the main stream expelled from the machine. The direction of flow from the entry to the exhaust orifice is indicated above. The proportion of air bypassed through the detector is about 2 or 3 per cent. of the total quantity.

One extremity of the tube is closed by a silvered concave mirror, 25 cms. diameter, and a source of radiant heat (x) is placed at a distance from it, equal to the focal length. The heat source consists of an incandescent lamp (absorbing about 300 watts), so screened that a cone of rays falls on the mirror. The partition between the two chambers ensures that exactly half of the calorific rays are directed into each chamber and reflected by the corresponding halves of the concave mirror.

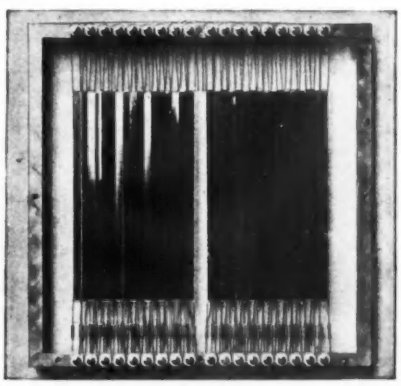
Due to the relative positions of the heat source and the mirror, the rays are reflected along parallel paths to the opposite end, where they strike a sensitive heat detector. The latter is divided into two equal sections, one in each compartment, and serves to compare the heat fluxes reflected from each half of the mirror. An illustration of the heat detector is given below. It consists essentially of two sets of pure nickel elements, 3 mm. wide and 1/100 mm. thick. The temperature of each group varies in accordance with the quantity of radiant heat reflected across the corresponding compartment. The variations in the calorific flux are followed, without any appreciable time lag, by temperature changes in the nickel elements, due to their high ratio of surface area to volume. The elements of the detector groups are connected in series and constitute two resistances which vary in ohmic value according to their temperature (the temperature coefficient of nickel being 0.006).



Method of Mounting

The two detector groups are each connected to resistances of constantin (an alloy of negligible temperature coefficient), to form a Wheatstone Bridge. By means of a galvanometer type relay any voltage difference can be detected at the two points of normally equal potential.

As long as the air is of exactly similar composition in the two compartments, the two groups of nickel strips receive equal quantities of heat. Under these conditions they are at the same temperature and have equal ohmic resistances. The Wheatstone Bridge is, therefore, balanced and no current passes through the relay. If the air expelled from the alternator contains fumes due to decomposition of insulation, some of the heat energy radiated from the mirror is absorbed by them, and the corresponding nickel strips become cooled by an amount depending on the nature and quantity of the particles in the air stream. The ohmic resistance of this group decreases below that of the group in the comparison chamber, as the latter is receiving the normal heat flux. The effect of this resistance variation is to destroy the electrical balance of the bridge, thus causing current to circulate in the relay. When the current exceeds a predetermined minimum value the relay closes its contacts, which are in series with the operating coil of an intermediate relay. The latter has an auxiliary mercury contact switch, capable of handling 1 kVA, which serves to trip the main alternator circuit breaker, and to operate the field suppression switchgear.



Heat Detector

Effect of Voltage Variation

The connections of the detector and relays are indicated on page 358. It will be seen that, within wide limits, the operation is independent of voltage fluctuation in the auxiliary d.c. supply. Although a variation in the voltage of the auxiliary circuit affects the sensitivity of the detector, the modification in the quantity of heat produced by the lamp affects both compartments to an equal extent, and the balance of the bridge remains undisturbed.

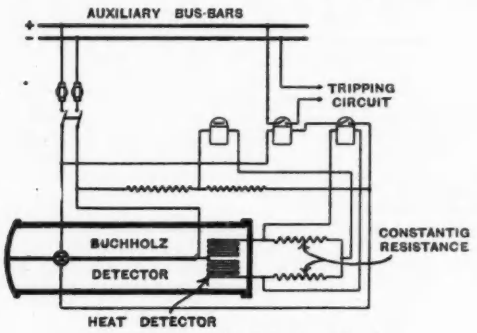
The temperature of the detector as a whole follows closely that of the hot air expelled from the machine. There is, in fact, a slight difference in temperature between the two compartments, during load fluctuation, due to the time required for heat transference, and this gives rise to a small difference of potential across the relay. The setting of the latter is adjusted so that it will operate only at a current in excess of that resulting from the anticipated temperature difference between the two sets of nickel strips. The fact that legitimate variations in the temperature of the hot air do not appreciably affect operation, has been proved by extensive tests. Experiments have been conducted which prove that the degree of humidity of the air, and the presence of small properties of hydrogen and carbonic acid do not disturb the balance to any measurable extent.

Working Tests

Practical tests carried out with the Buchholz detector connected in the closed air circuit of a turbo-alternator have afforded very interesting data concerning this method of protection. The alternator used for the tests was a 3,150-kVA, 6,900-volt, 1,500-r.p.m. machine, installed in an important Continental power station. The three principal classes of faults investigated were (*a*) short circuit between turns (*b*) short circuits between coils (*c*) faults to earth, these conditions being produced artificially.

The following is a summary of the conclusions definitely reached as a result of these experiments which covered a period of several months :—

The time which elapses between the commencement of a fault and the operation of the relay depends upon the gravity of the disturbance. The operating period varies between the very short time needed for decomposed particles to travel from the fault to the detector (*i.e.*, in the case of a serious fault) and a period of several minutes if the fault is such that heat is liberated slowly. These characteristics ensure that the fault cannot spread appreciably beyond the point of its initiation before the alternator is disconnected and its field suppressed. In confirmation of this statement it should be explained that, during the many tests conducted by simulating fault conditions of various kinds, only the faulty coil was damaged in each case.

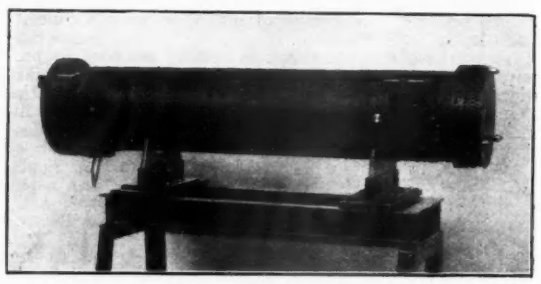


Connections with Tripping Circuit

Protection of Rotor

In addition to protecting the stator windings, the detector is influenced in the same manner by rotor faults and failure of the insulation between core laminations. Direct earth faults do not affect the detector unless the earth current is of sufficient magnitude to cause decomposition of the neighbouring insulation. It is interesting to note that the apparatus is sensitive to fumes which are imperceptible to the eye.

In the view of the Buchholz detector mounted ready for service in the cooling circuit of a turbo-alternator, the air passing through the detector is taken from the hot air stream through 3 in. piping arranged vertically, the upper end being funnel shaped. Expulsion takes place directly into the cold-air chamber.

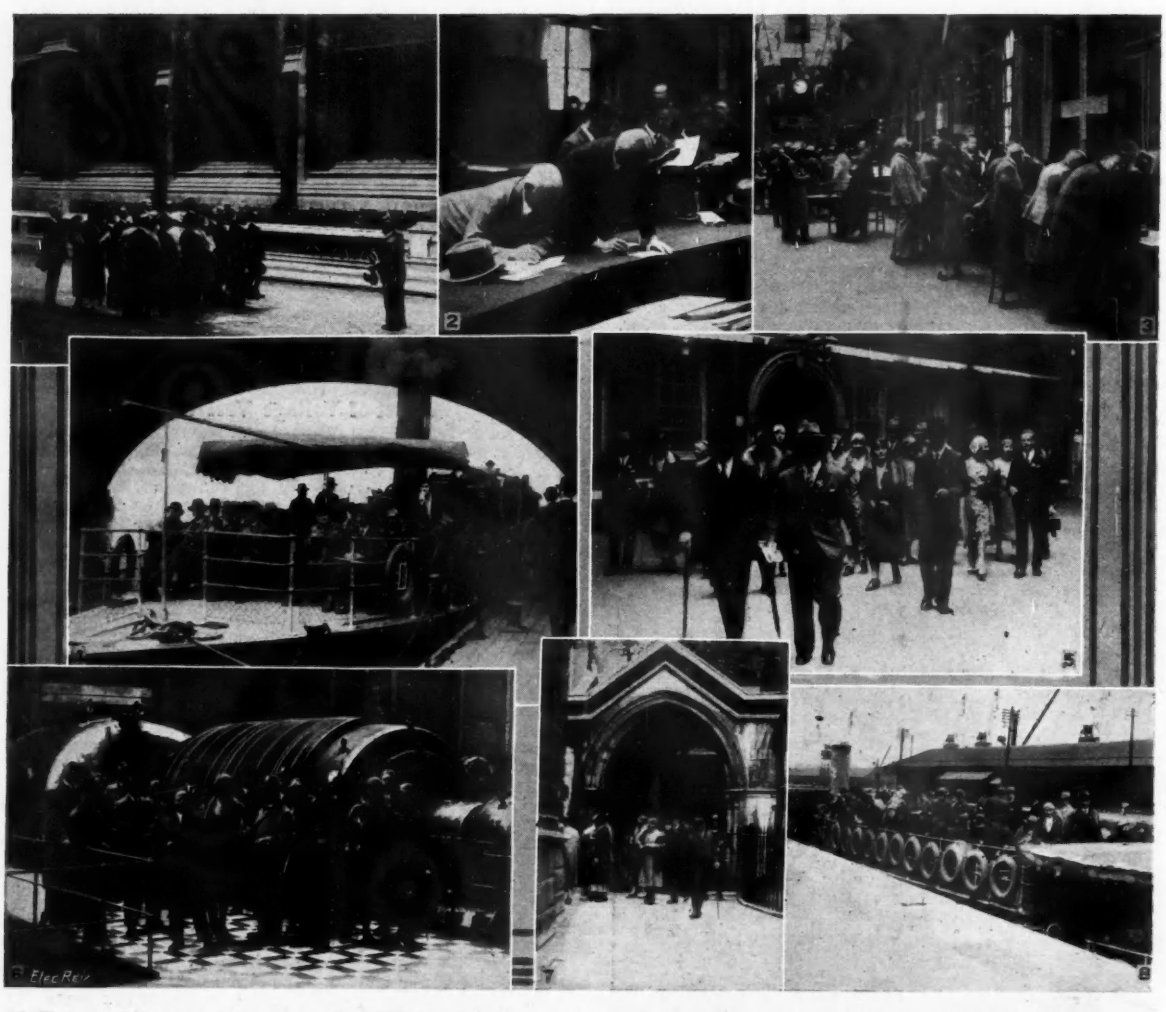


Buchholz Detector

A detector operating on this principle is inherently more sensitive in a closed air circuit than in the air stream of open-type machines.

The detector has aroused considerable interest on the Continent, and several well-known concerns have taken up manufacturing licences under the Buchholz patent. The author is indebted to Messrs. A.C.E.C. (Ateliers de Constructions Electriques de Charleroi), who manufacture this detector under licence, and to Mr. Buchholz, the inventor, for permission to reproduce the illustrations which appear in this article.

Illumination Congress Delegates Touring London

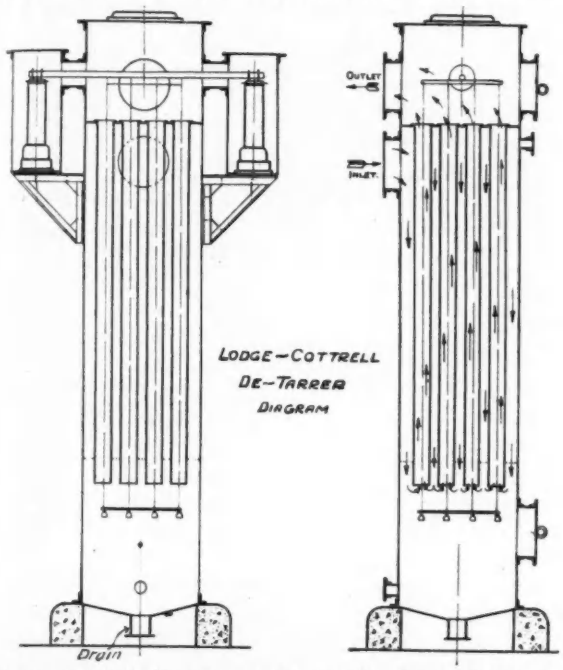


(1) Records Office inspection (2 and 3) Foreign delegates at the registration office (4) Embarking for the Port of London trip (5) At the Inner Temple (6) Deptford power station (7) The Temple Church (8) In Port of London lock

Electricity in the Gas Industry. By C. H. S. Tupholme

The Precipitation of Tar

THOUGH the competition between gas and electricity for industrial and domestic purposes leads some engineers in each industry to believe that there can be no good in the other, the facts remain that gas and coke-oven engineers are making increasing use of electricity in the carbonisation process, and electricity has been adopted wherever it has



demonstrated itself to be superior to other forms of energy.

In the matter of tar precipitation from coal gas it has been demonstrated quite conclusively that electricity can be used with an extraordinarily high efficiency.

The pioneers of this process were Sir Oliver Lodge and Dr. Cottrell, and their process is coming rapidly to the front, not only in gasworks, but also in other plant where suspended particles must be removed from gases. The efficiency of tar-fog removal by this process need never be less than 99 per cent. Briefly, the precipitator consists of a series of vertical pipes, through which the gases are led. In the centre of each pipe is an electrode charged at high potential. The resulting ionisation causes the particles of tar to be charged and to be forced away from the electrode to the pipe wall, which is earthed. The liquid slowly trickles down to the tar well, from which it is collected. The process has the merits of small power consumption, requires little attention and that unskilled.

The Lodge-Cottrell precipitator is placed immediately after the retorts, so that the tar is removed before it has an opportunity of fouling the plant. In addition, it makes possible the fractional separation of tar liquor and light oils.

The process was first used in America, and at the Denver gasworks an efficiency of over 92 per cent. was maintained with plant which dealt with a gas flow varying from 125,000 to 500,000 cu. ft. hourly. There, the total power requirements were of the order of 3.5 or 4 kVA. More recently, tests with this precipitator revealed an efficiency of approximately 99.9% per cent. The plant was working in conjunction with three settings of continuous vertical retorts, each consisting of four 5-ton retorts. The gas from the retorts entered the de-tarrer at an average temperature of 75.6 deg. C. and left it at 67 deg. C. The pressure drop between the two points was not above 1/10 in. water gauge.

A similar precipitator has recently been placed on the market by Simon-Carves, Ltd., of Manchester, in which the Westinghouse metal-oxide rectifier is employed.* It is illustrated below and the process is essentially the same as that evolved by Lodge and Cottrell.

The Simon-Carves plant employs no moving parts, and the static copper-oxide rectifier, though initially more expensive than rotating rectifying machinery, is claimed to give a better performance and to involve smaller maintenance costs.

The following data have been supplied by Messrs. Simon-Carves :—

Power consumed per hour by mechanical rectifier type precipitation equipment	2.75 kW
Power consumed per hour by static rectifier type precipitation equipment	0.98 kW
Power saved per hour	1.77 kW
Total saved per year	15,500 kWh
Saving per year at ¾d. per kWh	£48 10s.
Capital equivalent at 10 per cent.	£485

The power consumption of the Simon-Carves precipitator is less than 1 kW per 100,000 cu. ft. of gas at N.T.P., and the back pressure is below ¼ in. water gauge. A summary of the actual operating costs of a unit capable of treating 1,000,000 cu. ft. at N.T.P. is as follows :

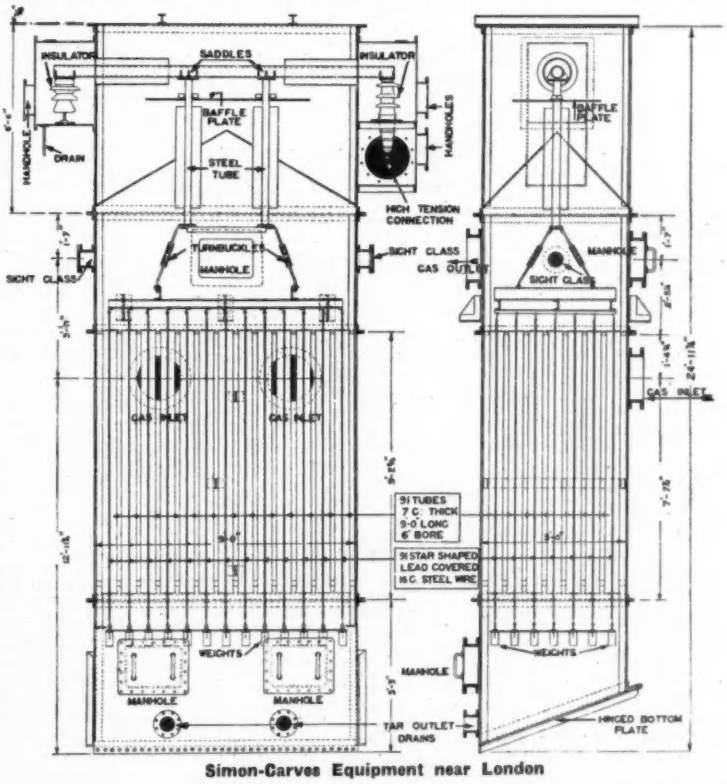
Power, 10 kWh at ¾d.	7½d. per day
Maintenance	2d. ,, ,,
Labour	3d. ,, ,,

A total of 1s. 0½d., or 0.0125d. per 1,000 cu. ft. of gas, or 0.15d. per ton of coal carbonised.

The set is controlled from an upright switch cubicle containing an ironclad double-pole switch and fuses, a double-pole circuit breaker with overload and no-volt trip coils, and a special voltage-regulating arrangement, consisting of an auto-transformer and a variable resistance of the slider type.

At the new Southall works of the Gas Light & Coke Co. an efficiency of 99.9 per cent. was obtained, and the precipitated tar was found to be suitable for making road tar, with the advantage that it will require no distillation. Similar plant is in operation at the "Coalite" works of the South Metropolitan Gas Co., and another deals with 7 million cu. ft. of coke-oven gas at the Billingham works of Imperial Chemical Industries, Ltd.

Electrical precipitation is also applicable for the removal of dust from gases, *e.g.*, blast-furnace gas, and in such cases mechanical rapping gear is employed for dislodging the dust from the pipes and wires. Such plant is in use for removing



Simon-Carves Equipment near London

dust from flue gas, producer and other combustible gases, pyrites-burner gases in sulphuric-acid manufacture, for the recovery of metallic dusts from refining furnaces, the collection of cement-kiln dust, while a later application has been in the collection of dust and grit from boiler-furnace gases.

* The drawing is reproduced from Mr. J. S. Thorman's paper on Southall gas works read before the annual meeting of the Institution of Gas Engineers, 1931.

Electricity in Mines

The value of good lighting on the grounds of safety and economy; a field for the battery locomotive

AS announced by us last week the Tenth Annual Report of the Secretary for Mines and the Annual Report of H.M. Chief Inspector of Mines (H.M. Stationery Office, 3s. 6d. net) for the year ended December 31st, 1930, have now been published.

The activity which marked the coal trade in 1929* was maintained in the early months of 1930, after which output declined to the level of 1928. The output of coal from 2,328 mines was nearly 244 million tons, 14 million less than in 1929. The decline was shared with the other chief exporting countries, *viz.*, Germany and Poland; elsewhere in Europe output was slightly higher than in 1929. Shipments of British coal abroad amounted to 75 million tons (or 7 million less than in 1929) at an average price of 16s. 8d. per ton (16s. 2d. in 1929). About two-thirds (4.1 million tons) of the total output of anthracite was exported, at an average price of 26s. 7d.

The average price of all coal disposable commercially was 14s. 1d. per ton (13s. 11d. in 1929) and of all coal raised 13s. 7d. per ton at the pithead (13s. 5d. in 1929, and 10s. 1¼d. in 1913). The average number of men employed was 748,657 below ground and 194,785 at the surface, the lowest post-war figures. Employment was also very much less regular than in the previous year.

The demand for coal for gas works (exclusive of coal equivalent of coke exported) and for railway locomotives has remained at from 16 to 17 million tons and from 13 to 14 million tons, respectively, for several years and corresponds closely to the figures for 1913. At collieries the consumption of engine fuel has declined from 18 million tons in 1913 to 13.5 tons in 1930. At electricity works the consumption has increased to 9⅜ million tons, or twice the quantity used in 1913, notwithstanding a steady decline in lb. per kWh generated. The net sales value at mines and quarries of minerals other than coal amounted to about £22,000,000 and about 105,000 persons were employed.

Increased Use of Mechanical Methods

While the output of coal declined by 5½ per cent. as compared with 1929, the tonnage of coal cut by machine increased by 5 per cent. In 1930, 75¾ million tons (31 per cent. of output) were cut by machine; 371 pneumatic picks were used to get ¾ million tons of this coal. 3,747 mechanical conveyors were in use for 42½ million tons (17½ per cent. of the output). 30½ million tons were loaded directly into tubs and 12 million tons were loaded with the assistance of 453 gate-end loaders.

There were 39,979 electric motors in use in 1,439 mines with a capacity of 1,823,628 h.p. The following electrically-driven machinery was installed of the h.p. capacity given in each case. Below ground: haulage, 400,818; conveyors, 22,426; pumping, 398,714; coal-cutters, 109,904; other portable machinery, 3,252; miscellaneous, 26,834; total, 961,948. At surface: winding, 152,083; ventilation, 120,246; haulage, 80,857; coal washing or screening, 161,958; miscellaneous, 346,536; total, 861,680.

Coal-cutting machines to the number of 7,637 were in use in 867 mines, of which 4,040 were driven by electricity and the remainder by compressed air. Conveyors were in use in 483 mines. Of the total number of 4,200, some 2,050 were electrically driven.

The quantity of coal treated at washing and cleaning plants installed at collieries and coke ovens in 1930 was 72¾ million tons (including more than 2¾ million tons of anthracite). In spite of the reduction in output as compared with the previous year, the quantity of coal thus treated increased by nearly 1½ million tons; the greater part of this increase was at dry-cleaning plants, the number of which in operation increased from 74 to 91.

Health and Safety

The Mining Association and the Miners' Federation have appointed committees for the purpose of discussion and informal co-operation with the Department on matters concerning health and safety. Another development has been the inauguration of a series of safety conferences or demonstrations in the different coalfields; these are to be followed by meetings, lectures and demonstrations on a smaller scale.

The Committee of Inquiry into the Qualifications of Colliery Officials has published its report. It expresses the opinion that the time has come for the duties of mechanical and electrical staffs to be defined by statute or regulations and that subsequently the question of requiring appropriate statutory qualifications should receive consideration.

The Coal Mines General Regulations (First Aid), 1930, came into force on April 1st, 1930. The organisation of first-aid and ambulance work has now been placed on a more adequate and uniform basis. One of the most successful changes effected by the Regulations is the substitution for use underground of small portable first aid outfits—examined and replenished at the surface—for the large boxes fixed underground which were very difficult to keep in good and clean order.

Under the provisions of the Coal Mines General Regulations (Safety Lamps), 1929, the practice of unlocking safety lamps at appointed lamp stations for the purpose of relighting ceased to be permissible after December 31st, 1930, in any mine or part of a mine in which safety lamps are required by law to be used, the only exception being mines of stratified ironstone in the Cleveland district.

It was decided in 1930 to institute official safety tests of the flame-proof character of electrical apparatus to be used where precautions against firedamp explosions were necessary. A new testing building for this work was built and equipped at Harpur Hill, Buxton. It was put into use in May of this year and an article on the subject appeared in the ELECTRICAL REVIEW of July 31st, 1931. The University of Sheffield decided that upon the institution of these official tests it would discontinue the unofficial tests which it has been carrying out for some years past.

Lighting Underground

Of recent years, there has been a steadily growing recognition in the mining industry of the importance of improved lighting as a means to greater health and safety and to increased efficiency. The use for electric accumulator lamps for more than two volts is developing, and for heavy semi-portable lamps 6-V accumulators are being successfully employed.

Departmental proposals for General Regulations have been drawn up whose effect is to fix a higher candle-power standard for new safety lamps, and to permit electric and other forms of lighting beyond a range of 300 yards from the face, which is the maximum at present, except for safety lamps. Efforts are also being made to secure a higher standard of lighting below ground with a view to reducing miners' nystagamus.

An example of the effect of good lighting is given as follows: At Warsop Main Colliery a conveyor face in the Top Hard Seam 160 yards long has been lighted by means of 6-volt safety lamps of 5 or 6 candle-power each. The height at this face here is about 6 ft. and the lamps are hung near the roof (the light being actually 4 ft. 9 in. from the floor) and spaced 10 yards apart along the face immediately over the conveyor belt. The face is supported entirely by steel props, all of which are whitewashed, and the combined effect of this and the flood lights is very marked; it is possible to see practically from one end of the face to the other. Such lighting is bound to have an effect upon the number of accidents occurring at the face in addition to giving advantages of cleaner coal and other economies in working.

This method of illuminating a face appears to be simple and effective and it is to be hoped will be adopted extensively. Roads whitewashed from end to end are not unknown and the latest example in South Wales is described as being in every way satisfactory.

Accidents in Mines

The numbers of persons killed and injured in 1930 were 1,013, and 166,281, respectively, giving a death-rate per 1,000 employés of 1.25 (1.29 in 1929). Falls of ground caused 0.69 deaths per thousand; underground haulage, 0.32; firedamp explosions, 0.09; in shafts, 0.04; and miscellaneous, 0.11.

The 18 fatal accidents by firedamp explosions resulted in 70 deaths; three of these accidents were due to electricity, causing three deaths and injuries to 13 others. In one case firedamp was ignited at a coal-cutting machine that was in a very neglected state of repair and was known not to be fireproof; another explosion was due to arcing in a switch terminal box; and in the third case, an explosion originated in a coal-cutting machine not so designed as to prevent open sparking. None of these three explosions should have occurred.

Of the 44 explosions caused by the use of naked lights, 32 occurred in the Scotland Division in mines in which, as a rule, little firedamp is found. These accidents could have been prevented by the use of safety lamps, but there is serious opposition, both by the owners and by the miners, chiefly because they believe that fewer accidents happen with naked lights. Investigations show, however, that this contention is invalid.

Battery Locomotives for Haulage

Accidents in connection with haulage operations come next, in number and seriousness, to those due to falls of ground. Where the conditions are suitable, haulage by storage-battery locomotives on well-laid heavy tracks along roads lined with steel arches, as is done in the mines in Scotland, appears to be the most effective cure for haulage accidents.

A start has been made to equip horses underground with electric lamps. The results so far are promising.

Electrical Accidents

Six men were killed underground by electricity during the year; three accidents were due to injuries to trailing cables, two to faults of design and inefficient maintenance, and one to the opening of a drum-type controller whilst the current was still on. Of the 73 persons killed at the surface, three occurred in connection with the use of electricity.

There were also 26 persons injured in all mines below ground and 10 at the surface.

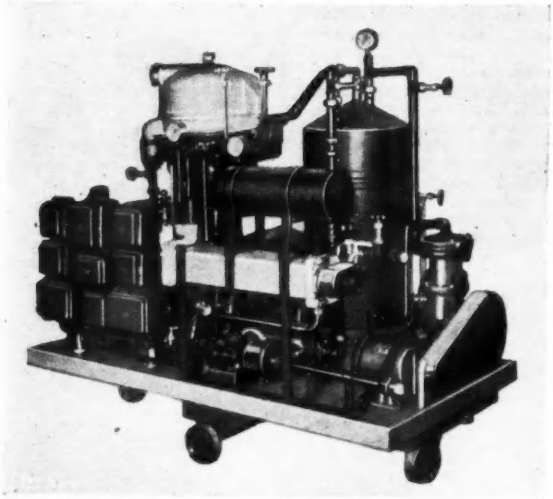
* ELECTRICAL REVIEW, September 12th, 1930.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Oil-purifying Apparatus

An entirely new form of oil-purifying apparatus which has recently been placed on the market by ALFA-LAVAL CO., LTD., 34, Grosvenor Road, S.W.1, consists of a specially constructed centrifuge from which the oil in a very finely divided form is sprayed out into a 90 per cent. vacuum. After leaving the vacuum covers of the centrifuge the oil is delivered into a tank where it is exposed for several minutes to further vacuum treatment. To obtain rapid evaporation at low temperatures it is necessary to spray the liquid in a very finely divided form into a vacuum; in the De Laval vacuum process the oil is so finely divided that 1 lb. of oil presents an area of about 1,500 sq. ft. to the vacuum. The boiling point of water at 90 per cent. vacuum is 46 deg. C.; tests have shown that by passing the oil through the equipment at 50 deg. C. all of the dissolved water is practically instantly removed. At this stage of the process the quantity of water is very small, the previous centrifuging having removed every particle of free water. The above treatment not only removes the dissolved water, but also in an equally efficient manner removes all the dissolved gases. All mineral oils can actually dissolve a certain quantity of water, so that oils treated by the previously used processes of dehydration are left in a saturated condition, with the result that any further addition of water exists in the form of free particles which quickly lower the dielectric strength. Two samples of the same kind of oil were prepared, one by means of the De Laval vacuum equipment and the other by means of a filter press. The breakdown



"De Laval" Centrifuge-vacuum Outfit

voltages of the two samples after the periods stated were as follows:—

Method of purification.	Dielectric strength when first purified.	Dielectric strength after 6 weeks.	Dielectric strength after 12 weeks.	Per cent. decrease in 12 weeks storage.
De Laval	180 kV/cm.	165 kV/cm.	160 kV/cm.	11
Filter press	155 kV/cm.	95 kV/cm.	75 kV/cm.	52

The hydroscopic property of the oil with zero dissolved-water content can be utilised to remove moisture from the windings of the transformer, the oil acting as a kind of sponge which sucks up moisture from the transformer and gives it up in passing through the vacuum equipment. An important feature of the new equipment is that it enables purification and dehydration of transformer oils to be carried out without the oil being at any time exposed to the atmosphere. The portable equipments are built in three standard sizes with capacities ranging from 200 to 900 gallons per hour.

Automatic Mercury Contactors

"Cutax" mercury contactors, which have been introduced by A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1, operate on the immersed-tube principle, thus eliminating retating parts, sparking, and wear of contacts. They are claimed to be noiseless in operation. The current consumption in the exciting circuit is very low, *viz.*, approximately 1 to 6 watts, and the switches are capable of controlling circuits up to 7 kW single-phase a.c., or d.c., and up to 21 kVA three-phase a.c. The contactors are unaffected by external influences, such as dust and damp, and they are not affected by vibration and will work perfectly satisfactorily if inclined up to 40 deg. from the vertical. The contactor can be supplied in single-, double-, or three-pole units, all of which can be constructed in sheet metal or cast-iron boxes. The main tube and float are constructed of quartz glass, and the tube is filled with a neutral gas mixture. The contactors are designed for breaking or making circuits up to 500 volts, whilst the control coil can be wound for voltages between 2 and 500.

Wind Dynamos

The success of the "Garty-Apex" multi-bladed wind dynamo and the demand for larger equipment encouraged the makers, GLASGOW ELECTRICAL ENGINEERING CO., LTD., 45-47, Pitt Street, Glasgow, to produce models with only two scientifically designed streamline blades and with the head modified so as to offer the least resistance to the wind. The weight and size of the head have therefore been very greatly reduced, and this, combined with the smaller exposed surface of the blades and head, lessens the stresses on the windmill and tower. The high output of the multi-bladed type has been maintained with the new model, and the advantages of the improved design make it suitable for serving large farms, groups of houses, &c. The windmill head is mounted on a strong four-post steel tower with a ladder, and the dynamo is arranged at the head, or if required a downshaft can be supplied to which the dynamo can be geared. The machine is governed by an overspeed centrifugal governor at the end of the propeller shaft, and the governor operates by pulling the blades partly out of the wind when the speed exceeds a predetermined limit. Starting and stopping are controlled by means of a wire placed at a convenient position at the base of the tower. When the wire is released it allows a clutch to engage and the wheel to put itself out of the wind. A light pull disengages the clutch and puts the wheel into the wind. Electrical control from a distance is effected by a suitable magnet attached to the control on the tower and operated by a switch placed at a convenient position, while automatic control is effected by a voltage relay placed across the battery.

"Garty-Apex" Streamline Wind Dynamo

Conduit Coupling Cover

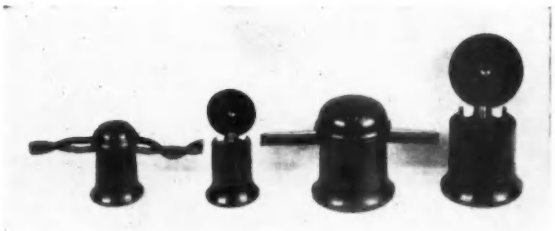
ADAMSON & OLIVERSON, LTD., 3, Dragon Avenue, Harrogate, have produced a cover for fitting over the openings of outlet conduit couplings so that the couplings can also be used as through couplings. The cover is secured to the coupling by two screws, the coupling being drilled and tapped, and it serves for inspection purposes.

Large Industrial Furnace

What is claimed to be the largest electric furnace in the world is one with a loading of 12,000 kW, which has recently been built by the HEVI DUTY ELECTRIC CO., of Milwaukee, U.S.A., whose patents for Europe are controlled by Wild-Barfield Electric Furnaces, Ltd., Elecfurn Works, North Road, Holloway, N.7.

Special Lampholders for Strip Work

Available in two sizes, one for the standard lamp cap and the other for an intermediate size, a new lampholder introduced by the UNION INSULATING CO., Parkersburg, W., Va., can be connected directly to the conductors without stripping the insulated covering from the wires. Connections are made without the use of either tape or solder, merely by screwing together the two pieces of the socket. One section contains

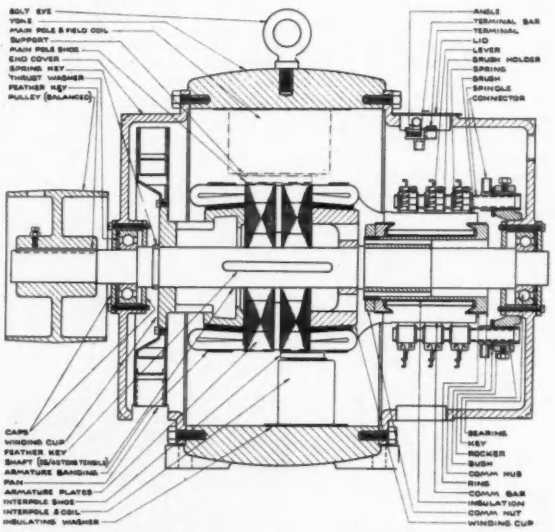


Lampholders with Insulation-piercing Pins

grooves in which the wires are placed, when the cap is screwed down tightly, whereupon two strong pins pierce the insulation and make positive contact with the conductor. The design is such that moisture is entirely excluded. The sockets are made of "Bakelite" and are very convenient for making up illuminating display sets for out-door use. Being attachable and detachable, a great variety of designs can be obtained, and, further, they make possible the addition of more lamp sockets to existing decorative sets.

Improved D.C. Motors

The accompanying sectional diagram of the new type "W" d.c. motor recently introduced by HIGGS MOTORS, Witton, Birmingham, exemplifies the progress made in recent years in the construction of industrial electric motors. It represents a range of machines which is intended to replace the "D"



Construction of Higgs "W" Motor

motors made by this firm since 1917. By very careful redesign the overall size has been considerably reduced, but this has not been done at the expense of active material, and the high standard of performance has therefore been maintained. A new scheme of ventilation has been adopted, and instead of a propellor fan one of the centrifugal type is now fitted, which draws the cooling air across the commutator and windings and exhausts it at the pulley end. The shafts, which are made from 35/40 tons tensile steel have been considerably increased in diameter, and a larger and heavier type of ball bearing is fitted as standard. The yoke is of fine graded cast-iron, and each end has a machined face with a female spigot. The feet are machined, and the fixing holes drilled to jig. From a mechanical point of view the machine is excellently protected, and can be made drip-proof by the simple expedient of fitting suitable packing material between the ventilating louvres and the end covers themselves. All machines are insulated suitable for tropical climates and humid atmospheres, and are designed and tested strictly in accordance with the appropriate British Standard Specification.

"Crypto Langham" Drive

Vertical Driving Unit

An interesting recent development of the CRYPTO ELECTRICAL CO., LTD., Acton Lane, Willesden, N.W.10, is the "Crypto Langham" vertical double-reduction geared unit. The motor is of ½ h.p. and runs at 400 r.p.m., reducing to 20 r.p.m through a vertical gear box. This box is arranged so that lubrication of the first pair of wheels is in a separate chamber to that of the second pair of wheels in the lower chamber, overflow arrangements being provided between the two portions. Various types of base can be supplied for these vertical units.

Fuse-wire Assortment

S. GUITERMAN & CO., LTD., 35-36, Aldermanbury, London, E.C.2, have recently introduced a convenient assortment of 12 yards each of 5-, 10-, 15-, and 20-A tinned-copper fuse wire wound on cards supplied to the trade packed in display boxes containing one dozen cards. Fuse wire is also supplied by this firm on 2-oz. and 4-oz. reels, in sizes from 2 to 25 A.

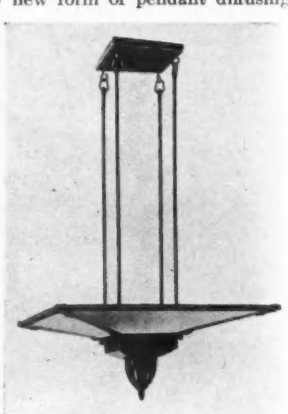
Milk-distribution Vehicle

Some interesting features appertain to the electric milk-distribution van which has been produced by WINGROVE AND ROGERS, LTD., Arundel Chambers, Strand, W.C.2, in conjunction with the D.P. BATTERY CO., LTD., Bakewell, Derbyshire, for United Dairies (London), Ltd. The chassis frame is dropped at the centre to bring the driver's footboard only a few inches above the kerb height, and the cab entry on both sides is made specially wide. Owing to the nature of delivery work involving short runs and many stops, the controls are arranged for the driver to stand up. These features allow of extremely quick entrance and exit for the driver, and very valuable time is saved which can be used for selling. The battery is mounted in a compartment immediately in front of the driver, and the removable cover forms a table which can be used for entering books, &c., under cover, or as a temporary resting place for goods. The removable cover gives access to the battery for weekly inspection and taking gravity readings, and the door at the side allows the battery to be removed when necessary, which is very seldom. The body arrangements can, of course, be altered to suit individual requirements. Goods are loaded at the rear and delivered from the front through the driver's cab, and this arrangement is expected to save much valuable time on the round. The wheels are of the pressed-steel disk type, with solid rubber tyres. The Victor motor is of 6 h.p. continuous rating, 80 volts, and is of the specially enclosed-ventilated type, readily accessible and liberally rated for overload. The reversible drum-type controller has heavy renewable copper finger contacts, giving series-parallel field control. There are four speeds forward and three reverse.

The cells of the D.P. battery are made up in the makers' wood trays, and accommodated on angle slides in the container at the front of the driver.

A Novel Lighting Fitting

The BENJAMIN ELECTRIC, LTD., Tariff Road, N.17, have recently marketed an entirely new form of pendant diffusing unit known as the "Shadowlite." This fitting depends basically upon the use of a special and fully patented glass on one side of which enamel has been fused by a special process. The light falling on a given surface appears to proceed not from a single source, but from all sides at once, and in this way there is an entire absence of reflected glare and shadows are virtually non-existent. The effect obtained by "Shadowlite" fittings is, in fact, very much that given by highly efficient cornice lighting, and the fitting is of a pleasing and dignified design which lends itself admirably to inclusion in modern architectural layouts. In respect of its high efficiency, its attractive appearance, and its omni-directional distribution of diffused light, the "Shadowlite" fitting is claimed to be unique.



The "Shadowlite"

Small Pumps

Recent experiments on a line of small pumps made by BROWNE & SHARPE MFG. CO., U.S.A., and marketed in this country by BUCK & HICKMAN, LTD., 2, 4 and 6, Whitechapel Road, E.1, have proved that the pumps can be very widely applied throughout industry generally. Of the three types available, geared, vane and centrifugal, the geared type is perhaps the most generally used, and it will operate successfully in pumping water, oil, compounds, and many other fluids of either light or dense character. When driven direct by a motor, speeds up to 1,200 r.p.m. and pressures up to 200 lb. per sq. in. can be maintained. The close fit of the gears in the casing ensures a minimum of slippage and renders the action of the pump positive for either pressure or circulation.

Ample suction, pressure and delivery, together with quietness in operation are salient features of this pump, and by the use of a gooseneck in the pipe on the suction side the pump remains primed and no check valve is needed. Several types of geared pumps are available, with capacities varying from 1½ gal. to 150 gal. per min. delivery, while some are supplied with a relief valve which then obviates the introduction of such a valve in the discharge line.

The geared and vane types are those most commonly used for machine-tool cooling systems, except in the case of grinding machines. On such machines the abrasive grit cannot be prevented from entering the cooling compound, and as this is detrimental to the gear mechanism of the pump, the centrifugal type with fan operation is recommended. The vane-operated model is a low-capacity pump usually employed for circulating oil to the cutting tools of the smaller types of machine tools.

The centrifugal pumps are for use with water only, and since the water does not come in contact with the bearings, they are well adapted for use on grinding, or other machines when the water which is being pumped contains a large amount of emery particles and grit. These pumps do not develop suction.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

State Trading Complaints in Victoria

Electrical traders and manufacturers in Victoria are very concerned at the rapid development of the trading in electrical appliances by the State Electricity Commission. The Commission bases its authority to enter the retail merchandising field on a general section of its Act of Constitution which empowers it to " carry on any business usually associated with an electrical supply undertaking." The manager of the Electrical Federation, Mr. A. D. Broad, maintains that the Commission's interpretation of this section was not contemplated by Parliament, but its merchandising department has expanded to proportions which make it one of the largest trading enterprises in Australia. It pays no municipal rates, nor is it subject to taxation, and being in direct contact with every consumer in the State it employs a staff of canvassers to exploit that advantage. Mr. Broad says the Commission requires all contractors and other persons to give notice of their intention to make an electrical installation and the Federation has good reason to believe that this notice is made use of to canvass the persons concerned for the supply of equipment. A particularly unfair feature, added Mr. Broad, was the policy adopted recently of branding certain equipment sold by the Commission with its trade mark. The quality was not challenged, though it was no higher than that of other equipment bearing a private trade mark, but the trade mark of the Commission was represented to consumers as a State imprimatur of excellence and was used to the detriment of competing products. The financial results of the Commission's merchandising department were never made public and there was reason to believe that if an account were published for this department and all fair costs were charged to it the annual operations would show a substantial loss, which was liquidated from profits on the electricity supply undertaking. Following the criticisms, the Minister in charge of electrical undertakings, Mr. Cain, has called for a report by the Commission.

The E.D.A. Calendars for 1932

Below we reproduce two calendars which have been prepared by the British Electrical Development Association for

The E.D.A. Calendars.

the coming year. The colours used for depicting the young ladies are both attractive and alluring—as, indeed, are the young ladies. E.D.A. is prepared to supply these calendars in quantities of 250 upwards at reasonable prices, a special discount being allowed to members of the Association.

Domestic Water Heaters

In our issue of August 21st, 1931 (p. 276), certain criticisms are made of the operation and design of water heaters. Messrs. FERRANTI, LTD., have drawn our attention to recent developments, which remove some of the objections mentioned in the case of the " push-through " heaters and wall-mounting type heaters. As stated in the article, one of the main objections to " push-through " heaters has been the drip at the outlet as the water is heated up, but they have recently put on the market an anti-drip valve which effectively prevents this, and is as simple in operation as an ordinary valve (see our issue of July 10th, 1931). With regard to the difficulty of removing the elements and thermostat from heaters installed where the height is limited, a range of wall-mounting type heaters is offered, with horizontal elements and thermostat, in sizes from 11 gals. Only sufficient head room to take the heater and the necessary connection is required, and no difficulty whatever is experienced in withdrawing elements and thermostat .

Floodlighting at Southend

Some very successful floodlighting experiments were carried out during the Carnival last week by the Southend-on-Sea Corporation Electric Lighting Committee. A very impressive effect was obtained by the floodlighting of the St. Mary's Church, Prittlewell, the type of architecture lending itself particularly well to the experiment. For the Cliff Gardens, a view of which is shown below, a number of special lanterns were supplied by Messrs. Restlight, Ltd., which had the double effect of reducing glare to a minimum and of showing up the flowers in their natural colours. Among other buildings illuminated were the Queen Victoria Monument and the High School for Boys. Strip-lighting was also erected close to the Pier. Mr. A. C. Johnson is the borough electrical engineer and manager.

The Floodlighted Cliff Gardens at Southend

Proposed British Empire Exhibition for Canada

According to a *Reuter* message from Toronto the holding of a British Empire Exhibition in Toronto in 1933 or 1934 was a suggestion put forward by Mr. Howard Ferguson, Canadian High Commissioner in London, when speaking at the official opening of the Canadian National Exhibition. He declared that the organisation of such an exhibition would offer great opportunities for promoting organised Empire trade.

Italian Radio Exhibition

The Turin correspondent of *World-Radio* reports that the third National Italian Radio Exhibition will take place in the hall of the Society of Fine Arts at Milan from October 10th to 18th. It is being organised by the Italian Radio Manufacturers' Association and the Society of Wireless Engineers. The National Congress of the Association of Italian Wireless Engineers will also be held during the exhibition.

A London Window Display

The accompanying illustration shows the latest window display of Sadia, Ltd. As will be seen, the display draws attention to the company's water heaters, the centre panel being 6 ft. by 3 ft. 3 in. and the two side panels 5 ft. by 3 ft. All three panels are attractively coloured and the heater is thrown out in bold relief against a suitable background.

A Sadia Window Display

Japanese Submarine Cable Manufacture

Our Tokyo Correspondent reports that the Japanese Government has considered the manufacture of submarine cables in Japan for many years. It is now said to have succeeded in arranging with the Sumitomo Electric Wire Works for the making of these cables, after long negotiations carried out with this works and two other big electric wire makers, the Furukawa and Fujikura concerns. The Sumitomo firm will establish a factory for the purpose somewhere in the Bay of Osaka at a cost of 600,000 yen, besides which 400,000 yen will be employed as working funds. At first gutta-percha cables will be made by the factory, which will commence work at the end of 1932 or the beginning of 1933. It is not yet decided whether the above factory will be controlled by a new company or by the present Sumitomo Electric Wire Manufacturing Co., Ltd., but it is probable that for the first few years the latter course will be adopted, and that when the business is made to pay it will be made over to a new company. In the meantime the Sumitomo firm will be satisfied with a price nearly as low as that of imported cables.

Dundee Buys More Foreign Cable

At a meeting of the Dundee Electricity Committee last week another tender for foreign (Belgian) cable was accepted in preference to a higher British offer. The Belgian cable was priced at £475, while the lowest British tender was £588. A motion that the British cable should be purchased failed to find a seconder.

New " Jackson " Showrooms

The accompanying picture shows a corner of the new showrooms which the JACKSON ELECTRIC STOVE CO., LTD., has

A Section of Jackson's New Showrooms

opened at its Birmingham branch, which, by the way, is very inappropriately situated in Needless Alley, New Street. We say " inappropriately " for the electric cooker is becoming a necessity in the modern home. An extensive range of the company's cookers, fires, and other appliances is on view in the showrooms and substantial stocks are carried at the branch.

Bulgarian Economic Conditions

A report upon trade and economic conditions in Bulgaria for the eighteen months ended June 30th last has been prepared by the Department of Overseas Trade from information supplied by Consular officers in that country. This states that although Bulgaria's agricultural exports in 1930 rose by 77 per cent. in volume, the value remained about the same owing to the fall in price levels. Nevertheless an adverse trade balance of about £3,000,000 was turned into a favourable balance of about £2,400,000 in 1930 owing to the curtailment of imports. It is stated that better trade prospects for imported manufactured goods will depend to a considerable degree on the future policy adopted towards the correlated questions of import duties and the protection of local industries, but in any case a general increase in imports beyond the 1930 mark can confidently be expected with an improvement of world markets for agricultural produce. Provided that ordinary caution is observed, Bulgaria remains, as in the past, a good market for British goods; and there should be no relaxation of effort towards maintaining, and even improving, the present degree of participation in its import trade.

The imports of " machines, tools and apparatus " in 1930 had a value of £964,000, against £1,730,000 in 1929. Great Britain's share of this trade fell from £80,000 to just over £20,000. No details of electrical imports are given.

United States Electrical Exports

In June a further decline occurred in exports of electrical machinery and equipment from the United States. The total for the month was $8,277,861, as compared with $10,774,204 in June, 1930. The value of these exports during the first half of the current year was $50,494,396. The figure for the corresponding period of last year was $71,573,219—there has thus been a fall of nearly 30 per cent. (The decline in British electrical exports during the same period was about 32 per cent.).

Decreases occurred in practically every item; the only outstanding increase was in the case of radio receiving sets, exports of which rose from $3,896,671 to $6,146,000. There were also larger shipments of steam turbo-generator sets, a.c. generators (2,000 kVA and over), arc-welding sets, and switchboard panels. Large declines were recorded against d.c. generators, from $799,886 to $346,535; flash-light batteries, from $1,793,467 to $1,202,241; power transformers (500 kVA and over), from $1,617,236 to $229,243, distribution transformers (under 500 kVA), from $1,278,277 to $405,567; power switches and circuit breakers (over 10 A), from $1,534,788 to $948,944; stationary motors (1 to 200 h.p.), from $2,192,701 to $945,720; household refrigerators, from $5,609,377 to $4,550,830; domestic washing machines, from $1,072,302 to $511,613; telephone apparatus, from $3,434,858 to $1,354,933; and insulated copper wire and cable, from $2,648,547 to $1,667,033.

All markets, with the exception of the Philippines, took smaller quantities of American electrical equipment. Canada's share was valued at $1,793,915, while Soviet Russia occupied second place with $1,076,790. The United Kingdom ($648,903) was third in the list.

Italian Lamp Production

The production of electric lamps in Italy during March last amounted to 1,936,403, bringing up the total for the first three months of the year to 5,900,171 lamps, as compared with 6,129,731 in the corresponding period of 1930.

Irish Free State's Revenue from Radio

The Irish Free State revenue accounts for the year 1930-31 have been issued, from which it is shown that the total revenue derived from the tariff on wireless parts imported into the Free State during the year was £34,663, whilst the sale of wireless receiving licences brought in £13,408, an amount which is slightly less than for the year 1929-30.

The " Model Engineer " Exhibition

The annual exhibition organised by the *Model Engineer* was opened yesterday at the Royal Horticultural Hall, Westminster, and will continue until September 12th. In conjunction with this exhibition is held the model-making championship of Great Britain, and 170 entries have been received from all over the country. Special displays are being made by the leading societies connected with model making, including the Society of Model Aeronautical Engineers, the Model Aircraft Club, the Model Yachting Association, the Model Railway Club, and the Society of Model and Experimental Engineers.

" Utilities " and the Sale of Appliances

Speaking at a recent luncheon, Mr. D. F. Kelly, president of the National Retail Dry Goods Association (U.S.A.) and chairman of the Electrical Merchandising Joint Committee, said (according to the *Electrical World*) that his Association was in no way connected with the efforts now being made to have legislation enacted prohibiting the sale of merchandise by utility companies. He maintained, however, that this business was better in the hands of the merchants. He said:—" We have been assured time and time again by representatives of utility companies operating in an ethical manner that they have no desire to be in the merchandising field. They state as their only reason for engaging in it the fact that merchants were not equipped properly to introduce electrical merchandise when these appliances first appeared on the market; consequently, utility companies were compelled to display, sell and service them. However, to-day their use has become so widespread that merchants, especially those in large cities, are capable of selling and servicing such appliances. So soon as it can be demonstrated, and I believe that will be very shortly, that the merchants of the country are capable of and willing to render this service, we shall expect the utilities either so to arrange their distribution that the merchants shall have an entirely unhampered opportunity of building up a large and growing business in this kind of material done at a proper profit, which is what the utilities should want if they do not already want it, or else we shall expect them gradually to fade out of this business of merchandising."

Italian Radio Import Duties

It is reported from Milan that the Italian Government intends to raise the import duties on wireless apparatus. Action in this direction is said to have been hitherto impossible as in the treaty with Switzerland the duties on radio articles were fixed, but by means of goodwill on both sides this obstacle has now been overcome. It is stated that the duties will be increased fivefold, which would be equivalent to an import veto.

Quarry Electrification

The electrification of the important Clee Hill Quarries, Shropshire, is now almost complete. Prior to being taken over by the British Quarrying Co., Ltd., under the chairmanship of Sir Henry P. Maybury (late Director of Roads, Ministry of Transport), the various crushing plants were run on steam coal, rough slack and Diesel oil. Electricity is obtained from the Shropshire, Worcestershire and Staffordshire Power Co., and the installation of the plant has been carried out by the English Electric Co., Ltd., and Power Installations, Ltd., Leicester. It is proposed to floodlight the quarries and interiors of plants so that work can be carried on during the short days without closing down at dusk as formerly. Since the speeding-up of output there is now little unemployment in the district, and many of the machines are working double shifts producing hard roadstone.

"Ever-Ready" Selling Campaign

We have received from the EVER-READY CO. (GREAT BRITAIN), LTD., Hercules Place, Holloway, N.7, particulars of its autumn selling campaign. This year the period is being extended to a fortnight, the inclusive dates being September 21st to October 3rd. The principal feature will be a window display competition, for which the company is offering substantial prizes. Display material is being provided free to competitors.

Another Birmingham All-electric House

A further all-electric house was opened by Councillor H. K. Beale, chairman of the Birmingham Electric Supply Committee, on August 24th. This is at Stratford Road, Hall Green, and, similarly to previous exhibition houses opened in Birmingham, the equipment installed is within the reach of the modest purse, assisted by the Corporation's hire-purchase schemes. At the opening ceremony, Councillor Beale said that people had the impression that electricity was very dear. That was far from being the case; speaking for himself, he had found that there was little difference in cost when he changed over from coal, while electricity possessed many advantages which other media lacked. The owner of the house has placed it at the disposal of the Birmingham branch of the E.D.A. for a period of three weeks.

Marine Engine Makers' Alliance

A bid to capture for Great Britain a bigger share of the marine engine business of the world is to be made by Messrs. RUSTON & HORNSBY, LTD., and Messrs. R. A. LISTER & Co., LTD., who have established jointly a new company, the Ruston Lister Marine Co., Ltd. Two directors from each of the parent companies will be on the board of the new company, which will have behind it the assets of the two concerns and their subsidiaries of over £6,000,000. The registered offices are to be at Imperial House, Kingsway, W.C.

Polish Electrical Imports

During June last the value of conductors, apparatus and other electrotechnical materials imported into Poland was 3,609,000 zloty (£83,000).

An Indian Trade Report

The report on the work of the Indian Trade Commissioner during 1930-31 by Mr. H. A. F. Lindsay, C.I.E., reviews the effects of the world economic depression on Indian export trade, and deals *seriatim* with the principal commodities which India exports. Among the articles mentioned is mica, it being stated that shipments of mica, block and splittings, showed a considerable decrease from the previous year, amounting to 40,000 cwt., the United States of America taking 22,000 cwt. less, France 3,000 cwt., the United Kingdom 8,000 cwt., and Germany 6,000 cwt. Prices have moved in accordance with the general trade conditions. At the present time inferior grades and sizes of mica, block and splittings, are almost unsaleable, and the demand for the better qualities very fitful. In these conditions dealers and consumers are not disposed to carry stocks. The shipments of wolfram to the United Kingdom increased during 1930-31 by 2,000 tons, in spite of the depressed state of the market. Steatite has received a good deal of attention. Some of the Indian deposits are of excellent quality and, if properly graded, might find a market. An appendix contains an extract from the report of the officer appointed to deal with matters relating to lac. This officer says that modern manufacturers when confronted with the choice of a raw or semi-manufactured material for use in their factories, which gives them a reasonably stable price with absolute purity and stable qualities, and an article which gives them neither, very naturally select the former. Fluctuating and often excessive prices, adulteration and unreliable quality have done a very great deal to undermine the position once held by lac in certain fields of manufacture. The inroads of synthetic resins have been serious, and natural lac products would be in a worse position still were it not for the comparative cheapness of lac now and for some time past. It is clear that if the situation is to be relieved better methods of handling and packing lac are necessary.

The Philips' Organisation in France

The Amsterdam correspondent of the *Financial Times* says that after prolonged negotiations Philips' Incandescent Lamp Works, of Eindhoven, has concluded an agreement in regard to the working of the radio patents in France with the Compagnie Générale de Télégraphique sans Fil, which company, with its many subsidiaries, is the leading French radio concern. The manufacture of Philips' valves destined for French consumption will in future be concentrated in the Paris factory of the Société Radio-Technique, a subsidiary of the French company. It is stated that this agreement, together with the recently-concluded agreements between Philips' Lamps and the Compagnie des Lampes, of Paris, will bring about an important revival in the French national radio industry.

Uruguayan Import Duties

H.M. Consul-General at Montevideo has reported by cable with respect to the law recently passed with the object of restricting imports into Uruguay. The Uruguayan Government has decided to cancel the prohibition of imports contemplated under that law and to confine itself to a 50 per cent. increase in the duty upon certain classes of merchandise for one month dating from August 27th. H.M. Consul-General is officially informed that this increase will not be applied to British commerce and conditions for this country will remain *in statu quo*.

Swiss Electrical Exports

The exports of electrical machinery and apparatus from Switzerland during the six months ended with June last attained a value of £1,640,000, as compared with roundly £2,000,000 in the corresponding period of 1930.

Electrical Manufacturing in Russia

A scheme is reported from Moscow, prepared by the Electrical Machine Construction Undertaking, for the establishment of large manufacturing works in the region of the Ural at an estimated expenditure of 700 million roubles. As projected, the works would be formed of three undertakings which would produce turbo-generators and machines aggregating 2,500,000 kW per annum, together with transformers, cables and apparatus.

All-Electric Houses Too Cheap!

According to the *Daily Express* (Scotch edition), the rents of the all-electric houses of the Irvine Town Council's latest scheme are half those of the less commodious houses built by the Council in 1919. This position arises from the fact that the better houses cost less to build owing to the fall in builders' prices. This explanation, however, does not soothe the tenants who are paying the higher rent, and they have besieged the Town Council with requests for transfers and demands for rent reduction.

Book Notice

"Technische, Wirtschaftliche und Rechtliche Grundlagen für die Bewertung und den Verkauf Elektrischer Arbeit," by Ing. Gustav W. Meyer. Pp. 200. Bodenbach a.d. Elbe (Czecho-Slovakia): Meyer's Technische Verlags Buchhandlung. Price 9.60 Rm. (about 9s. 9d.).—This is the latest of many books in German dealing with "The Technical, Economic and Legal Basis of Electric Power Distribution and Sale," each section of the subject being dealt with in the usual comprehensive continental style. Intended for the guidance of consumers as well as producers. there is much material of an elementary character, while a good deal of space is devoted to a description of the mechanism and action of various types of electricity meters. While, doubtless, the work is one that may find a ready sale in Czecho-Slovakia and also in German-speaking countries, we fear it is not one that will appeal in any way to English electrical engineers.

For Sale

Messrs. Hall, Pain & Foster, invite offers for electrical gear at H.M. Stratton Factory, Swindon.

(See our advertisement pages to-day.)

Recent Contracts

The ELECTROFLO METERS CO., LTD., has secured the order for the complete instrument equipment for the Battersea generating station of the London Power Co., Ltd. This order covers a complete set of instruments for application to the boiler and turbo-alternator plant, comprising a series of six individual boiler control panels and the main control-room panel; a four-sided extensive turbine instrument panel; and a series of panels carrying auxiliary instrument equipment. The instruments ordered are for the measurement of the boiler and turbine steam, turbo condensate and circulating water, temperature, pressure, CO_2, steam flow-air flow ratio, draught, &c. The contract also includes a semi-portable Venturi-type feed-water test-metering installation. All the instrument panels will be formed of heavy-section steel sheets, finished in high-quality black cellulose enamel, with untarnishable metal trim. The company will also install the connections between the boiler instruments and points of measurement.

A contract has recently been placed with the D.P. BATTERY CO., LTD., for "Kathanode" batteries for two battery operated locomotives which are to be used for shunting work in connection with the extensions for the Underground Railway. The locomotives, which will be of standard gauge, will each be fitted with a "Kathanode" battery consisting of 220 cells type K.L.21, capacity 228 ampere-hours at the 5-hour rate of discharge.

Price Reductions

The GENERAL ELECTRIC CO., LTD., has reduced the prices of the whole range of its wireless batteries.

The CHLORIDE ELECTRICAL STORAGE CO., LTD., announces reductions in the prices of "Exide" wireless, automobile, and other batteries.

Trade Announcements

Messrs. MATTERSON, LTD., Rochdale, have appointed Messrs. Tom Smith & Clarke, Ltd., Gower Chambers, Gower Street, Swansea, agents for the whole of their specialities for South Wales. Mr. R. Sell, 33, Coleys Lane, Northfield, Birmingham, has been appointed agent for the counties of Warwickshire, Worcestershire and Staffordshire.

The INDIA RUBBER, GUTTA PERCHA & TELEGRAPH WORKS CO., LTD., has transferred its head office and London branch to Aldwych House, Aldwych, W.C.2. The telephone number is Holborn 8461 (8 lines).

New Catalogues and Lists

MARELLI & Co., LTD., 19 and 20, Garlick Hill, Queen Victoria Street, London, E.C.4.—List M.A.3100, giving particulars of the company's latest type of three-phase motors with outputs up to 10 h.p.

GENT & Co., LTD., Faraday Works, Leicester.—An illustrated folder relating to "Tangent" bells and small motor syrens, and "Pul-syn-etic" impulse clocks.

The PROVINCIAL INCANDESCENT FITTINGS Co., LTD., Pifco House, High Street, Manchester.—A comprehensive general catalogue of "Pifco" products for the 1931-32 season. The publication is excellently illustrated and contains sections dealing with all kinds of electrical accessories, domestic appliances, lighting fittings, flashlamps, radio batteries and instruments.

The BENJAMIN ELECTRIC, LTD., Tariff Road, Tottenham, London, N.17.—An illustrated booklet on modern garage lighting, dealing with the use of the "Benjamin Duoflux" floodlight unit.

The BRITISH THOMSON-HOUSTON Co., LTD., Crown House, Aldwych, London, W.C.2.—Leaflets, window bills and price cards, giving prices and particulars of "Mazda" electric lamps.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Publications P.261 and P.264, containing respectively full particulars of the B.I. tee, service and straight joint boxes; and fuse boxes and switch fuses.

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4.—Leaflet 667, giving full particulars of the reduced prices of "Full-o'-Power" radio batteries. Also price list No. 502/F, containing particulars and prices of all types of Siemens electric lamps.

Calendar blotters for September have been received from the following: The JACKSON ELECTRIC STOVE Co., LTD., 143, Sloane Street, London, S.W.1; WARREN BROTHERS (MIDDLESBROUGH), LTD., Middlesbrough; S. ROGERS & Co., LTD., 15, Fitzroy Street, W.1; and MAVOR & COULSON, LTD., 47, Broad Street, Glasgow.

POPE'S ELECTRIC LAMP Co., LTD., 5, Arthur Street, New Oxford Street, London, W.C.2.—Folder 5949, giving illustrations, particulars and prices of "Elasta" electric lamps. Also a calendar-blotter for September.

BERRY'S ELECTRIC, LTD., 85-86, Newman Street, Oxford Street, London, W.1.—The new season's catalogue of "Magicoal" fires. The publication is profusely illustrated (partly in colour), and is bound in an attractive imitation leather cover. Also a leaflet dealing with the smaller types of "Magicoal" fires.

STANDARD TELEPHONES & CABLES, LTD., Connaught House, Aldwich, London, W.C.2.—A booklet (G.577/3), giving full technical details of the "Standard" improved cathode ray oscillograph, type 4018-A.

The IGRANIC ELECTRIC Co., LTD., 149, Queen Victoria Street, London, E.C.4.—A number of publications relating to the company's programme for the new season. Reductions in prices are announced of various types of coils, chokes, condensers, transformers, &c., and a number of new lines are being introduced, including new transformers, resistances, potential dividers, and dual-wave coils.

THE COVENTRY CHAIN Co., LTD., Spon End Works, Coventry.—The 1931-32 combined catalogue of "Coventry" and "Renold" products, which include chains for industrial power transmission, chaincases, lubricators, chain wheel cutters, &c.

Forthcoming Exhibitions

Among the exhibitions which are taking place during the autumn are the following which will possess features of interest to the electrical and allied trade:—

The International Shipping, Engineering and Machinery Exhibition. September 10th to 26th, at Olympia, W.

The National Radio Exhibition. September 18th to 26th, at Olympia, W.

Faraday Centenary Exhibition. September 23rd to October 3rd, at the Royal Albert Hall.

International Inventions and General Trades Exhibition. September 30th to October 10th, at the Central Hall, Westminster.

Scottish Ideal Home Exhibition. September 30th to October 24th, at Kelvin Hall, Glasgow.

Coal-Face Machinery Exhibition. October 2nd to 10th, at Sheffield.

Northern National Radio Exhibition. October 7th to 17th, at the City Hall, Manchester.

Better Housing and Housekeeping Exhibition. October 13th to 24th, at Newcastle.

International Automobile and Motor Boat Exhibition. October 15th to 24th, at Olympia, W.

Ideal Home Exhibition. October 17th to 31st, at the Waverley Market, Edinburgh.

Building and Allied Trades Exhibition. October 20th to 31st, at Manchester.

Better Housing and Housekeeping Exhibition. October 27th to November 7th, at Leeds.

Bankruptcy Proceedings

Gordon Estates Co., electrical and general merchants, 133-6, High Holborn, W.C. The first meeting of creditors was held on August 31st at London Bankruptcy Buildings before Mr. E. Parke, Official Receiver. The debtor, Douglas Smith, stated that he registered the above trading style; also that of Douglas Smith and Co. in October, 1916. He began business in 1910 with a loan of £1,000 from his father and acted as agent for French manufacturers dealing principally in electrical fittings, also in bone and wooden articles. During the war years the business was carried on by a manager under the supervision of his father. In 1929 he embarked upon building operations and also traded as a builders' merchant. Early this year creditors began to press and on August 17th one of the number obtained a receiving order against his estate. The meeting was adjourned with a view to the appointment of a trustee.

J. D. Waller, electrical engineer and contractor, 9, Sackville Street, Skipton, Yorkshire.—The first meeting of the creditors was held on August 25th at the Official Receiver's office, 12, Duke Street, Bradford. According to the statement of affairs there were liabilities amounting to £337 against assets of £28. Debtor attributed his failure to lack of capital and bad trade. The case, being a summary one, was left in the hands of the Official Receiver as trustee of the estate.

E. T. Colley (Central Radio Co.), 11, Merrial Street, Newcastle-under-Lyme.—Receiving order made, August 24th, on a creditor's petition.

C. Foulston, motor and electrical engineer, 18, Wollaston Road, Cleethorpes.—First meeting, September 5th, at the Official Receiver's office, St. Mary's Chambers, Great Grimsby. Public examination, October 1st, at the Town Hall, Great Grimsby.

D. Makin, electrical engineer, 48, Dronfield Road, Pendleton, Salford.—Trustee, Mr. E. E. Groome, 4, Norfolk Street, Manchester, appointed August 25th.

J. L. Goldsman, radio engineer, 100, High Holborn, W.C.2.—Last day for receiving proofs for dividend, September 11th. Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C.

A. S. Heslop, model experimental and radio engineer, 24, Park Place East, Sunderland.—Last day for receiving proofs for dividend, September 12th. Trustee, Mr. W. A. Ellis, 14, John Street, Sunderland, Official Receiver.

Company Liquidations

G. J. Scragg & Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Parsonage, 1, Frodsham Street, Chester. Particulars of claims to the liquidator by October 3rd.

Selectors, Ltd.—Particulars of claims by September 16th to the liquidator, Mr. W. R. Sharp, 11, Waterloo Place, Pall Mall, S.W.

Oswestry Electric Lighting & Power Co., Ltd.—Meeting, October 9th, at Prudential Chambers, Oswestry, to receive an account of the winding up by the liquidator, Mr. G. N. Sinclair.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price Sept. 1st	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5½d.	...
a	Ammoniac, Sal ... ... per ton.	£60	...
a	Ammonia, Muriate(large crystal) ,,	£52	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac T.N.... ... ... per cwt.	£4 5s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£85 to £90	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet and Foil ... ,,	1/1 to 2/9	...
b	Babbits Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£117	£4 inc.
	Grade II ... ... ,,	£84	£3 inc.
	Grade III... ... ... ,,	£69	£1 inc.
c	Brass (rolled metal 2' to 12' basis) per lb.	6½d.	½d. dec.
c	,, Tubes (solid drawn) ... ,,	9d. to 9½d.	...
c	,, Wire, basis ... ... ,,	7¾d.	...
c	Copper Tubes (solid drawn) ... ,,	10d.	...
g	,, Bars (best selected) ... per ton.	£64	...
g	,, Sheet ... ... ,,	£64	...
g	,, Rod ... ... ,,	£64	...
d	,, (Electrolytic) Bars ... ,,	£98	...
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£48	...
d	,, ,, H.C. Wire per lb.	6¾d.	...
f	Ebonite Rod ... ... ,,	1/3 to 1/6	...
f	,, Sheet ... ... ,,	1/3 to 1/6	...
n	German Silver Wire ... ... ,,	2/1	...
h	Gutta-percha, fine ... ... ,,	nom	...
h	India-rubber, Para fine ... ... ,,	9¾d.	¼d. dec.
i	Iron, Pig (Cleveland No. 3) ... per ton.	58/6	...
l	,, Wire, galve. No. 1, P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£13	5s. dec.
g	Mercury ... ... per bot.	£16 5s.	...
e	Mica (in original cases) small ... per lb.	6d. to 3/6	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	8/6 to 17/6 & up	...
p	Phosphor Bronze, plain castings ,	1/1½d.	...
p	,, ,, drawn bars & rods ,,	11d.	...
p	,, ,, rolled strip & sheet ,,	11¾d.	...
p	,, ,, wire ... ... ,,	1/-	...
o	Platinum ... ... per oz.	£8	...
d	Silicium Bronze Wire ... ... per lb.	9¾d.	...
r	Steel, magnet, in bars ... ... ,,	7¾d.	...
g	Tin, Block (English) ... ... per ton	£121 10s. to £123 10s.	£5 10s. inc.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	2/10d.	...

Quotations supplied by

a	G. Boor & Co.	g	James & Shakespeare.
b	The British Aluminium Co., Ltd.	h	Edward Till & Co.
c	Thos. Bolton & Sons, Ltd.	i	Bolling & Lowe.
d	Frederick Smith & Co.	l	Richard Johnson & Nephew, Ltd
e	F. Wiggins & Sons.	n	P. Ormiston & Sons.
f	India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.	o	Johnson, Matthey & Co.,
		p	C. Clifford & Son, Ltd.
		r	W F Dannis & Co.

Electricity Supply

Lighting, Domestic, Power

Aberdeen.—CHEAPER ELECTRICITY.—The Corporation Electricity Committee has decided to make the following reductions in electricity charges as from the quarter ending December next: Lighting flat rate: From 3¾d. to 3½d. per kWh. For consumers using 5,000 kWh or over per half year: 6d. per kWh (present rate 6½d.) for the first hour daily of the maximum demand or its equivalent, and 1¾d. per kWh (no change) for all subsequent supplies. Power: First 125 kWh per quarter, 2½d. per kWh (present rate 3d.); all energy consumed over 5,000 kWh per quarter, 0.70d. per kWh (present rate ¾d.).

Aldershot.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the past year record a total revenue of £26,771 and a working expenditure of £15,504, leaving a gross profit of £11,267. Interest on loans repayments and items of special expenditure, less interest and rents received, amounted to £7,728, leaving a net surplus of £3,539. During the year expenditure on capital account amounted to £3,138, bringing the total capital expenditure to £105,628. Electrical energy sold increased from 1,354,021 to 1,525,893 kWh. The maximum load was 1,086 kW.

Ayrshire.—NEW ELECTRICITY CHARGES.—The Ayrshire Electricity Board announces a new list of charges to operate as from October next. Under the rateable value system there will be an annual fixed charge equal to 15 per cent. of the assessed rental of the house (minimum £3) plus ½d. per kWh for all energy consumed. A two-rate tariff is also being introduced.

Birmingham.—ELECTRIC LIFT FOR POLICE STATION.—The Corporation Watch Committee is to install an electric passenger lift at Steelhouse Lane police station.

Bournemouth.—STREET LIGHTING.—At a recent meeting of the Corporation Lighting Committee letters were received in connection with the provision of street lighting in the Throop district and it was decided to communicate with the local electricity company with regard to laying mains.

Brierfield.—RATEABLE VALUE TARIFF ADOPTED.—The Urban District Council is introducing a new electricity tariff based on the rateable value of the property supplied.

Burnley.—MOUSE CUTS OFF SUPPLY.—A mouse entering one of the cubicles at the Holmby Street sub-station, creating a short circuit, was the cause of a failure of the electricity supply lasting about ten minutes on August 25th.

Canada.—GATINEAU COMPANY'S PROGRESS.—The Gatineau Power Company, a division of Canadian Hydro-Electric Corporation, Ltd., reports that the consumption of electrical energy for lighting and domestic purposes showed an increase of 13 per cent. for the first six months of the year, as compared with the corresponding period last year. The total output of the company for that period was one per cent. above that of the first six months of 1930. In the month of June the value of the company's sales of electrical apparatus was 17 per cent. over that of June last year, the estimated annual consumption of electrical energy added by the appliances sold being 94,000 kWh.

Chester.—YEAR'S WORKING.—Mr. S. E. Britton, the city electrical engineer, reports a net profit of £10,344 on the working of the electricity undertaking for the past year.

Chesterfield.—YEAR'S WORKING.—In his annual report on the working of the Corporation Electricity Department for the year ended March 31st last Mr. D. H. Davies, borough electrical engineer, states that sales of electricity amounted to 12,222,251 kWh, there being an increase of 18 per cent. in energy sold for lighting purposes. Electricity consumed for domestic purposes also showed an increase of 24 per cent. The net profit was £6,249, as compared with £2,516 in the preceding year, the average price obtained per kWh being 1.42d.

Clacton-on-Sea.—YEAR'S WORKING.—The accounts of the Urban District Council Electricity Department (engineer: Mr. G. Broadhurst) for the year ended March 31st last record a total revenue of £38,316 and a working expenditure of £20,133, leaving a gross profit of £18,183. There was a net profit of £909. The number of consumers connected during the year was 430, making the total at March 31st, 4,967. Sales of electricity amounted to 2,425,213 kWh, which represents an increase of approximately 20 per cent. over the previous year. The maximum load recorded increased from 1,151 to 1,201 kW. The average price obtained per kWh was 3.086d., as compared with 3.205d. in 1929-30.

LOANS.—To meet requirements for the current year it is recommended that the Council should make application for sanction to the borrowing of £3,500 for mains and services, £800 for meters, and £1,500 for domestic appliances.

THE DOMESTIC TARIFF.—The Council is also recommended to reduce the "unit" charge of the domestic tariff from 1d. to ¾d.

Clitheroe.—NEW ELECTRICITY CHARGES.—The Town Council has approved the following new scale of charges: Shop window lighting after 8 p.m.: Reduced from 3d. to 1½d. per kWh. Lighting for displays and demonstrations: Reduced from 3d. to 1d. per kWh. Off-peak tubular heating for shops, offices, houses, or works: 1d. per kWh. "All-in" domestic tariff: The quarterly charge for houses with a rateable value of between £13 and £25 to be 1s. in the £; for houses with a rateable value of from £26 to £50 the charge is to be 9d. in the £; and for houses over £50 rateable value, 6d. in the £. Consumers under the new tariff must consume or pay for 240 kWh per £ of the fixed quarterly charge each quarter, all energy over this amount being charged at the rate of ¼d. per kWh.

YEAR'S WORKING.—Submitting the annual report of the Corporation electricity undertaking at a recent meeting of the Town Council, the Mayor, Councillor J. Boothman, drew attention to the continued progress of the undertaking and the remarkable increase in the sales of electricity during the past four years. For the years 1928-31 the energy sold amounted respectively to 250,000, 500,000, 750,000 and 1,250,000 kWh. Last year the number of consumers increased by 30 per cent., largely as the result of a scheme for assisted wiring having been adopted. Fewer than a dozen streets in the town are now without a supply of electricity and further extensions are under consideration. The total revenue amounted to £12,000, the gross profit being £4,800. There was a net profit of £500. Small surpluses were also shown in respect of the supplies to outlying areas.

Colne.—YEAR'S WORKING.—The Corporation Electricity Department last year recorded a net profit of £96.

Continental.—GERMANY.—For the first time in its history, the Berlin electricity supply undertaking (Bewag), as a result of the existing industrial depression, has to report a reduction in the sales of power during the past year, the total having amounted to 1,291,000,000 kWh, as compared with 1,324,000,000 kWh in 1929, a decrease of about 2.5 per cent.

A return just to hand shows that the output of the 122 principal electricity supply undertakings in Germany during May last amounted to 1,103,900,000 kWh—the lowest monthly total so far this year. The aggregate for the first five months of the year was 6,075,200,000 kWh, as compared with 6,976,400,000 kWh in the corresponding period of 1930.

BELGIUM.—A contract has just been secured by the Société d'Electricité de Seraing et Extensions and the Société d'Electricité du Pays de Liège for the supply of all the electric power required by the Société du Charbonnage de Bonne Fin, near Liège. In return the Liège electricity undertaking has contracted to take from the Bonne Fin colliery a greater annual tonnage of coal than would have been used had the colliery concern decided to generate it own electric power.

SPAIN.—The Government has decided to lay before the Chamber a Bill granting a credit of ten million pesetas (approximately £200,000) for the Ebro water power scheme.—*Reuter* (Madrid).

POLAND. — The report of the Société Centrale Régionale de Pruszkow for last year shows that the output of electricity amounted to 26,724,200 kWh, as compared with 23,867,980 kWh in 1929, and that the sales showed an increase of 17 per cent. The company has now 267 miles of distribution mains in operation, including 33 miles of 35,000-V transmission lines. A further 20-mile 35,000-V line has also been completed between the power station and Zyrardow, while a similar line 7½ miles in length, connecting the station with Warsaw, is approaching completion.

The Swiss Motor Columbus Co. is reported to be in negotiation regarding the establishment of electric power stations in North-West Poland.

Coventry.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the year ended March 31st show an available surplus, after adding the balance of £3,592 brought forward, of £17,399, as compared with a surplus of £21,236 in 1929-30. The number of consumers was 27,841, an increase of 3,613, while sales of electricity amounted to 89,828,583 kWh, a decrease of 1,865,967, due entirely to the decline of the industrial load. A decrease in bulk supplies resulted in a higher average price per kWh being obtained and accordingly the revenue from bulk supplies remained practically the same. The total revenue was £348,477, as compared with £346,849 in the preceding year, working expenses totalling £196,273, an increase of £1,059. During the year capital expenditure amounted to £118,166, bringing the total now spent on the undertaking to £1,916,713.

Fleetwood.—YEAR'S WORKING.—There was an increase of £2,007 in the gross profit of the Fleetwood electricity undertaking for the past year, the total being £18,468. The net profit was £6,100, an increase of nearly £1,100. Sales of electricity rose by 405,716 kWh to 3,897,571 kWh, the number of consumers now being 4,341, an increase of 84. Seventy-seven per cent. of the houses, public buildings, &c., in the town are now supplied with electricity.

FLOODLIGHTING DEMONSTRATION.—The Council has authorised the electrical engineer to arrange for a demonstration of floodlighting the new marine lake.

SUPPLY DIFFICULTIES.—A forecast of a serious position in the town's electricity supply was made to the Council on August 26th by Mr. C. Sayer, chairman of the Electricity Committee. He said that several months ago the Council had applied for sanction to a loan to extend its plant, but was prevented from going forward on the grounds that a supply would be available from the grid during the coming winter. The Central Elec-

tricity Board promised to erect an overhead line, but no practical steps had yet been taken. A deputation which went to London was, however, given an assurance that the work would be put in hand immediately.

Greenock.—REDUCTION FOR LARGE CONSUMERS.—The Corporation at its last meeting fixed a reduced rate of electricity charges to large power consumers who guarantee a minimum consumption of 100,000 kWh per annum.

Grimsby.—YEAR'S WORKING.—There is a net profit of £5,023 on the Corporation electricity undertaking for the year ended March 31st last.

Harrogate.—YEAR'S WORKING.—The total revenue of the Corporation electricity undertaking for the past year amounted to £85,017, an increase of £9,908 as compared with the previous year. Working expenses decreased from £36,732 to £35,729 mainly on account of a saving on coal, which was made possible by the introduction of new boilers and more efficient plant. The gross profit was £49,288, as against £38,377. After providing for loan charges, &c., there was a net surplus of £16,121, an increase of £4,635 over the preceding year's figure. Electricity generated amounted to 13¼ million kWh, while new consumers connected numbered 1,635, making a total of 8,891.

Hunmanby (Yorks.).—INAUGURATION OF SUPPLY.—A supply of electricity was inaugurated on August 17th.

Japan.—ELECTRICAL DEVELOPMENT.—Considerable activity is at present being shown in Japan in connection with the extension of the electricity supply industry. The following are some of the more important schemes in progress or under consideration: The erection of a 30,000-kW thermal power station by the Yamaguchi Prefectural Electric Bureau, at a cost of 6,500,000 yen; the erection of a 10,000-kW thermal power station by the Formosan Power Co.; the extension of the Joshibata power station by the Kyushu Hydro-Electric Co.; the construction of two power stations at Nishikubo and Hoshimata, on the Azuma River, by the Azumagawa Power Co.; the development of approximately 30,000 kW of hydro-electric power from the Kumano River, by the G.I.R.; the erection of a 40,000-kW power station to utilise the water from Lake Tazawa, by Mr. S. Nokanao; and the construction of a 10,000-kW steam or Diesel-engine power station by the Tokyo Municipal Electric Bureau.

ANOTHER PREFECTURAL ELECTRIC BUREAU.—The Iwate Prefectural Government is contemplating the constitution of a bureau for the purpose of taking over the electrical enterprises in the prefecture.

Leek.—YEAR'S WORKING.—In spite of a reduction in electricity charges amounting to approximately £4,000, the Urban District Council electricity undertaking showed a net profit of £1,756 for the past year. The number of consumers increased during the year from 2,540 to 2,960 and about 400,000 additional kWh of electricity was sold as compared with the previous year.

Maidstone.—YEAR'S WORKING.—The Corporation Electricity Department shows a gross profit of £46,120 and a net profit of £3,744 for the year ended March 31st last. The reserve fund now stands at £45,000.

SUPPLY TO DETLING.—The Town Council is to apply for sanction to the borrowing of £2,400, the estimated cost of extending mains to supply Detling.

Exterior Lighting of the I.E.E. Building

Manchester.—LOAN FOR MAINS.—The Corporation has obtained sanction to the borrowing of £50,000 for mains.

Mansfield.—SPECIAL ORDER.—The Corporation has applied to the Electricity Commissioners for a Special Order authorising it to extend its area of supply so as to include the parish of Pleasley, in the Blackwell rural district.

YEAR'S WORKING.—The Corporation Electricity Committee reports a surplus of £4,554 for the past year.

Mountain Ash.—YEAR'S WORKING.—An increase from 1,292,371 to 1,502,305 kWh in the sales of electricity is recorded in the annual report of Mr. E. W. Jones, general manager of the Urban District Council electricity undertaking. There was a gross profit of £10,005, as compared with £8,833 in the preceding year, the net profit amounting to £6,640 (£5,887).

Newcastle-under-Lyme.—YEAR'S WORKING.—The accounts of the Corporation Electricity Department (engineer: Mr. A. J. C. De Renzi) for the twelve months ended March 31st last, show a total revenue of £16,320 and a working expenditure of £9,928, leaving a gross profit of £6,391. The corresponding figures for the preceding year were: Income, £15,436; working expenses, £8,170; gross profit, £7,266. After deducting capital and other charges there was a net profit of £1,112, as against £1,892 in the preceding year. The capital expenditure at the end of the year was £87,448. New records were established both as to the number of consumers added and the output, the latter being over 25 per cent. above that of 1930, and for the first time exceeding a million kWh.

Northern Ireland.—LURGAN.—The annual report on the operation of the Urban District Council electricity undertaking records a total revenue of £6,331 and a working expenditure of £3,130, leaving a gross profit of £3,201. The net profit was £541, an increase of £213 as compared with the previous year. Electricity generated increased from 588,276 to 663,746 kWh.

Radstock.—STREET LIGHTING.—The Urban District Council has accepted the tender of the North Somerset Electric Supply Co., Ltd., for the lighting of the streets by electricity in the coming winter.

Rugby.—REDUCED CHARGES FOR RURAL DISTRICT.—The Leicestershire and Warwickshire Electric Power Co. has reduced the charges for lighting from 7d. to 6d. per kWh, and the domestic tariff from 1½d. to 1d. per kWh in the Rugby rural district.

Scarborough.—STREET LIGHTING.—The Town Council is contemplating substituting electricity for gas for street lighting purposes and has instructed the borough engineer to submit a scheme of lighting to the Electricity Committee.

Sheffield.—MAINS EXTENSIONS.—The Corporation Electricity Committee has authorised mains extensions costing £2,100.

Shipley.—YEAR'S WORKING.—The accounts of the Urban District Council electricity undertaking for the past year show a gross profit of £10,820 and a net profit of £47.

South Africa.—GROWTH OF ELECTRICITY SUPPLY COMMISSION.—Owing to the rapid growth of the Durban load, the Electricity Supply Commission is installing an additional 12,000-h.p. turbine and two new boilers. The capital of the Commission is now over £8,000,000 and its annual revenue is £1,000,000. The total capacity of its main generating plant is now 227,000 kW. Sales of electricity last year amounted to nearly 900,000,000 kWh, the average price for energy supplied by the Commission being 0.27d. per kWh.

THE GRAAFF-REINET CHANGE-OVER SCHEME.—A meeting of Graaff-Reinet property owners has confirmed by a majority of two votes the proposal of the Town Council to borrow £30,000 for converting the electricity supply system from d.c. to a.c., and for the erection of a new power station. There is a good deal of opposition to the scheme and a poll is to be taken.

Steyning.—EXTENSIONS.—The Steyning Electric Light Co., Ltd., is taking steps to give a supply of electricity before the end of the year in the district between Steyning and Pulborough. Overhead lines are now being erected between Steyning and Washington, and will be extended later to Storrington.

Stockport.—OPENING OF ELECTRICITY WORKS EXTENSIONS.—The formal opening of the extensions of the Corporation electricity works is to take place on September 26th, the ceremony being performed by Councillor Joseph Morton, chairman of the Electricity Committee.

Swinton and Pendlebury.—CHANGE-OVER.—The Urban District Council Electricity Committee has decided to change-over the system of electricity supply from d.c. to a.c.

West Linton.—INAUGURATION OF SUPPLY.—West Linton's new electricity supply was inaugurated last Friday by Mrs. Thomson, of Kaimes, who performed the ceremony of switching on the supply at the Lothians Electric Power Co.'s sub-station at Croft Road. Members of the Linton Council were present and Mr. H. G. Babb, manager of the company, presided. A special display of electrical apparatus was held in a marquee.

Workington.—YEAR'S WORKING.—The accounts of the Corporation Electricity Department show a gross profit of £4,161 and a net profit of £704 for the year ended March 31st last.

Traction

Argentina.—TRAMWAYS AND MOTOR-'BUS COMPETITION.—In recent years motor-'buses have become very popular in Argentina and are seriously competing with the electric tramways. As the latter are working under direct concession from the municipal and provincial authorities a number of tramway companies have recently raised the question as to whether the local authorities are legally entitled to grant concessions for 'buses which compete with the tramways. Counsels' opinions have been secured in both Argentina and Europe, and as these have been to the effect that no such right exists, several of the tramway undertakings are takings steps to secure that the terms of their concession are adhered to. The Société des Tramways de Rosario has, however, decided against any legal action but has opened up negotiations with the Rosario municipality. These have been in hand for some time and at the annual meeting held recently, the chairman of the company stated that although a satisfactory settlement is anticipated, they were seriously considering what steps should be taken if the desired result was not attained. He added that the directors had even gone so far as to consider the advisability of entirely closing down the tramways.

Irish Free State.—CORK.—The change-over of the city's transport system from trams to 'buses is now almost completed and the remaining tramway services will be discontinued at the end of this month.

Japan.—NEW ELECTRIC RAILWAYS.—The Kwanto Electric Railway has decided to commence work shortly on the Furukawa-Iwai section of its railway electrification scheme. The construction of another electric railway twelve miles in length between Shibuya and Kichijoji is also included in the first portion of an electrification scheme to be carried out by the Tokyo Electric Railway.

RAILLESS CARS FOR YAMAGUCHI.—The Yamaguchi Prefectural Electric Bureau is considering the question of running railless cars in the city.

London.—ELECTRIC SIGNALLING AT KING'S CROSS.—According to *The Times*, the installation of an electric system of signalling at King's Cross by the London and North Eastern Railway is nearing completion, and the first section will shortly be put into operation. The scheme involves the conversion of the entire manual system which has hitherto been in use. A large central signalling box is being erected containing an all-electric power interlocking frame having 232 levers, and the equipment also includes 60 long-range colour lights and 90 short-range shunting lights, as well as route indicators for the better guidance of engine-drivers. The new method of signalling is intended to facilitate the movement of trains in and out of King's Cross, and when complete will be used for suburban as well as long-distance traffic, and also for through traffic from the London and North Eastern to the Southern Railway.

TRAMWAY IMPROVEMENTS AT FINCHLEY.—A scheme costing approximately £41,700 is under consideration for the construction of a tramway roundabout and station at North Finchley.

Middlesbrough.—TRAMWAY ABANDONMENT.—The Corporation Tramways Committee has made provisional preparations for the abandonment of the tramway system between North Ormesby and Stockton and the substitution of 'buses.

Newcastle-upon-Tyne.—PROTECTION OF TRAMWAYS.—At a recent meeting of the Northern Area Traffic Commissioners it was announced that the Commissioners' decision regarding the protection of municipal transport undertakings would be given on September 17th when they sit at Middlesbrough.

South Shields.—SPEED-UP.—A reduction of 10 per cent. in the running time of tramway services on five routes is planned by the Corporation Tramways Committee. A number of alterations and improvements are being made at the termini and cross-overs to facilitate the higher-speed programme.

Telegraph and Telephone

Australia.—RADIO-TELEPHONY.—Direct communication by means of radio-telephony is reported to have been established between Rio de Janeiro and Sydney last week.

Belgium.—LOAN FOR EXTENSIONS.—It is announced that with the object of financing the extension programme until 1933, the Belgian State Telegraph and Telephone Exploitation Co. is to raise a loan of 650 million fr. (about £3,714,300).

Egypt.—AUTOMATIC TELEPHONY.—Our correspondent in Egypt informs us that the special new auto-exchange equipment of the ministries and their administrative departments has been officially opened in Cairo and its suburbs, but the opening of the Cairo general auto-exchange equipment has been postponed till the beginning of October of this year. The special equipment is installed at Bab-el-Louk (near most of the ministries) and has 2,000 lines, the total cost being £E28,638 for the equipment and £E3,630 for the building. The contractors for this equipment were Standard Telephones and Cables, Ltd., of London.

NEW WIRELESS STATION.—Our correspondent in Egypt reports that the Government has decided to install a powerful wireless station in Upper Egypt, which will be either at Luxor or at Aswân, in order to facilitate air navigation The cost of this station will be met from the budget surplus of the current financial year, 1931-32.

Germany.—TELEPHONY.—The Berlin telephone department has instituted an information service for subscribers. Calls to which there is no answer will be taken, and supplied later to those for whom they are intended. The service also will communicate changes in telephone numbers to all subscribers, and it will deliver messages left with it for subscribers who do not answer calls.

Italy.—NEW WORK.—To provide further work for the unemployed this winter the Italian Ministry of Communications has arranged to spend 1,865,526,000 lire (about £20,000,000) upon improvements to the railways, and to the postal, telegraph, and telephone systems. The number of men so to be employed will be about 120,000.

Russia.—NEW USE FOR WIRELESS.—According to the *Morning Post*, the Moscow newspaper *Isvestia*, which is stated to have a circulation of two million copies, has been making experiments in the transmission of copies of its pages by wireless telegraphy, in order that the paper may be published simultaneously in two places.

Switzerland.—NEW EXCHANGE.—A new automatic telephone exchange has recently been completed in the town of Schlieren.

Venezuela.—NEW RADIO STATION.—*Reuter's Trade Service* learns from Caracas that a contract has been awarded to the Telefunken Company of Berlin, which has erected several radio stations in Venezuela, for the erection at Maracay (capital of the State of Aragua) of a radio transmitting and receiving station, complete, short wave, 20 kW, for telephony and telegraphy. The station will be able to maintain constant communication, day and night, with Europe and the United States. The work will be carried out under the direction of Herr Neumann, director and chief technician of the Venezuelan Radiotelegraphic Service. The cost, which will be borne entirely by the national government, is estimated at 783,276 bolivianos. The Government has also arranged with the same company for the erection of a supplementary installation as a protection against possible failure of power, which is to be supplied by a local company.

Radio

Austria.—WIRELESS ON 'BUSES.—*Modern Transport* states that tests are being carried out in Vienna with a number of 'buses equipped with wireless receivers. If the tests are successful and the innovation proves popular, all the 'buses operated by the Vienna municipality will be so equipped.

France.—BROADCASTING BILL.—*World-Radio* reports that it is understood that the Commission appointed by the Government to prepare a broadcasting plan for France, and presided over by General Ferrié, has made suggestions for (1) two stations of 100 kW each, situated some distance from Paris—one for long waves and the other for the medium broadcasting band (Eiffel Tower and Paris PTT); (2) six regional stations of from 60 to 80 kW (Lille, Rennes, Bordeaux, Toulouse, Lyons, and Limoges), and one station of 20 kW (Grenoble); (3) relaying stations of small power. The difficulty will be to provide for all the private stations that now exist, some of which, if not all, will still continue to transmit.

Germany.—SUBSCRIBERS INCREASING.—According to the German newspapers, the number of radio subscribers in Germany increased from 2,635,000 in 1929 to 3,066,000 in 1930 and further to 3,700,000 on April 1st, 1931. Germany thus occupies seventh place (24.3 subscribers per 100 dwellings), coming after Denmark, the United States, Sweden, Great Britain, Austria and Hawai. The development is ascribed in the first place to the establishment of the large new Muhlacker station at Heilsberg, the increase in the efficiency in the transmitters previously erected and to technical improvements of transmitting and receiving apparatus. Since 1929 the sales of radio receiving sets have increased by about 30 per cent. both in number and value.

Italy.—THE NEW TRIESTE STATION.—The Turin correspondent of *World-Radio* says that the new Trieste station made its initial, experimental transmission on August 10th. Tests will probably be continued until October when the new station will be formally inaugurated. At the same time, it is hoped that the Genoa and Bolzano transmitters will commence using higher powers.

New Zealand.—CORPORATION CONTROL.—Broadcasting is to be controlled by an independent board modelled on the British Broadcasting Corporation. The Government is introducing legislation providing for such a body to take over the service on the expiration of the New Zealand Broadcasting Company's licence in December.—*Reuter* (Wellington).

Portugal.—BROADCASTING SERVICE COMMENCED.—According to the *Wireless World*, the first attempt in Portugal to provide a regular broadcasting service is now being made by Abilio Nunes dos Santos, Lisbon. The station, which is private, has the call-sign CTIAA, and is now operating on 291 metres, with a power of 2 kW. Regular programmes are given on Mondays, Wednesdays and Saturdays from 10.20 p.m. to 12.20 a.m. On Thursday an additional 42.9-metre transmission is provided with announcements in Portuguese, French, English, German, and Italian.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Australia.—VICTORIAN ELECTRICITY COMMISSION.—November 16th. Aluminium steel cored cable. (See this issue.)

Ayr.—September 10th. County Council. Electrical work in 38 houses at Auchinleck. Shedules from Mr. W. Reid, county architect, 14, Wellington Square.

Beverley.—September 26th. East Riding and York Joint Board for Mentally Defective. Electrical installation at Brandesburton Hall. (See this issue.)

Cranwell (LINCS.).—September 17th. H.M. Office of Works. Electric wiring at the R.A.F. College. (August 28th.)

Edinburgh.—September 12th. Corporation. Installation of electric lighting in 354 houses at Stenhouse Mills housing area. Specifications, &c., from engineer's office, Dewar Place (deposit £1 1s.); tenders to Town Clerk.

Egypt (CAIRO).—October 8th. Prison Administration. Diesel engine driven generator for Abu Zaabal power station. (A.X. 11055.)*

October 28th. Department of Public Health. Electro-medical and X-ray apparatus for six months commencing November next. (A.X. 11069.)*

December 2nd. Ministry of the Interior. Complete power station for the town of Tantah. (A.X. 11066.)*

Fife.—September 15th. County Council. Electric lighting at Kirkcaldy West School. Schedules (deposit £1 1s.) from Mr. G. Sandilands, architect, Education Offices, Kirkcaldy.

Glasgow.—September 9th. Education Department. Installation of electric lighting at Balmore School. Specifications, &c., from the education officer, Education Offices, Bath Street (deposit £1 1s.).

Hastings.—September 8th. Electricity and Public Lighting Committee. Overhead and underground lines. (August 14th.)

London.—CENTRAL ELECTRICITY BOARD.—September 21st. Construction of site works, foundation works, &c., at Agecroft, Clarence Dock, Crewe, St. Helen's, Blackburn and Nelson. (August 14th.)

September 21st. Construction of site works, foundation works, &c., at Oxford, Gloucester, Bourne Valley, Swindon, Newport and Plymouth. (August 21st.)

LONDON COUNTY COUNCIL.—September 16th. Wiring and fittings for public staircases, &c., at Boundary Street estate, Shoreditch and Bethnal Green. (August 28th.)

September 14th. Wiring and fittings for electric lighting and bells at the Education Divisional Offices, Pentonville Road, N.1. (See this issue.)

September 21st. Wiring and fittings at St. James Hospital, Balham. (August 28th.)

OFFICE OF WORKS.—September 15th. Electrical and mechanical engineering labour in Cardiff. (August 21st.)

METROPOLITAN WATER BOARD.—September 17th. Switchboard for two 200-kW and one 50-kW generators at Surbiton pumping station. (August 28th.)

FULHAM.—September 23rd. Borough Council. Wiring for lighting, heating and cooking for Swan housing scheme. (See this issue.)

Milngavie.—Town Council. Electric lighting of housing scheme. Schedules from Mr. F. A. B. Preston, housing architect, 6, Buchanan Street, Milngavie (deposit £1 1s.).

New Zealand.—WELLINGTON.—November 19th. New Zealand Railways. Intercall telephone system between Christchurch and Invercargill. (A. 11060.)*

Public Works Department. October 20th. Boosting transformers. (A.X. 11040.)*

December 15th. 270 galvanised steel transmission line towers, complete with arms, ground stubs and accessories. (G.X. 10703.)*

November 17th. Four 3,333-kVA oil-immersed self-cooled transformers. (A.X. 11079.)*

Oldham.—September 17th. Public Assistance Committee. Electric lamps required at the Institution, Rochdale Road. Specification from public assistance officer, Public Assistance Offices, Rochdale Road.

Plymouth.—September 14th. Electricity Department. E.h.p. metal-clad switchgear. (August 21st.)

Portsmouth.—September 9th. Electricity Department. Cables. (August 14th.)

September 19th. Electricity Department. Three l.p. substation switchboards. (See this issue.)

Salford.—September 16th. Electricity Department. Annual supply of 6,600/400-V three-phase transformers. (See this issue.)

South Africa.—PRETORIA.—September 25th. Town Council. Sub-station switchgear. (A.X. 11075.)*

September 18th. Switchgear and auxiliary apparatus required in connection with the installation of one, or alternatively two, 12,500-kW sets. (A.X. 11037.)*

Sunderland.—September 14th. Corporation. Cable, wire, meters and lamps. (August 14th.)

Warrington.—September 21st. Electricity Department. Twelve months' supply of cables, earthenware conduits, concrete slabs and tiles. (See this issue.)

West Ham.—September 14th. Education Committee. Installation of electric lighting at South Hallsville Senior, Cheshunt Road and Pretoria Road Schools, now in course of erection. (August 14th.)

Wick.—September 7th. Electricity Department. Boiler plant, turbo-alternator, condensing plant, rotary convertor, h.p. and l.p. switchgear, and accessories. (August 21st.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Australia.—N.S.W. Public Works Department. Accepted:—
Conductor for Koorawatha-Grenfell transmission line (£2,416).—British Insulated Cables, Ltd.
Victorian State Coal Mine. Accepted:—
1,875-kW turbo-alternator (£11,611).—Metropolitan-Vickers (Aust.) Pty. Ltd. —*Tenders.*

Bury St. Edmunds.—Education Committee. Accepted:—
Solid drawn sherardised tubing for electric lighting installations (£179).—Mann, Egerton & Co., Ltd.

Dundee.—Town Council. Recommended:—
Electric lighting required in erection of east and west wings of City Square.—D. J. McDonald, Ltd.

Irish Free State.—FERMOY.—North Cork Board of Health. Accepted:—
Electric lighting installation at the district hospital (£1,099). —O'Shea, Ltd.

Lamp Contracts.—The Southern Railway has placed contracts with the British Thomson-Houston Co., Ltd., the Metropolitan-Vickers Electrical Co., Ltd., and the Edison Swan Electric Co., Ltd., for a supply of electric lamps for one year commencing September 1st, 1931.

The British Thomson-Houston Co., Ltd., has also received a contract from the Admiralty for vacuum and gasfilled lamps.

Manchester.—Electricity Committee. Accepted:—
Electric lift for offices in Dickinson Street.—Etchells, Congdon & Muir, Ltd.
Automatic telephone equipment.—Standard Telephones and Cables, Ltd.
33,000-V switchgear extensions and alterations to feeder equipments at Barton station.—British Thomson-Houston Co., Ltd.
33,000-V switchgear extensions at Dickinson Street station. —Ferguson, Pailin, Ltd.
Health Committee. Accepted:—
Additional electrical work at Abergele sanatorium.—R. H. Clampnett & Co.
Education Committee. Accepted:—
Electrical installations in schools: Mauldeth Road school.—John Collier & Co., Ltd.; Southall Street school.—W. H. Smith & Co.; Abbott Street school.—A. Loudon.
Alterations and additions to electrical installation at Cheetham senior school.—W. A. Shaw & Co.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended:—
1,000 reflectors for street light fittings (£177).—British General Electric Co., Ltd.
Copper wire.—Cable & Engineering Co. (£1,713); Guest, Sykes, Ltd. (£818); British General Electric Co., Ltd. (£589).
Cooking and heating apparatus at fire station (£308).—S.A. General Electric Co., Ltd.; British General Electric Co., Ltd. (£44); Albert Vaux, Ltd. (£366).

Forthcoming Events

International Illumination Congress.—September 3rd-5th, Glasgow. September 5th-8th, Edinburgh. September 8th, Buxton. September 9th, Sheffield. September 9th and 10th, Buxton. September 10th-12th, Birmingham. September 13th-18th, Cambridge. September 19th, London.
September 1st—October 3rd. 9 p.m. to midnight each day. Illumination of principal London buildings.

New International Association for Testing Materials.—September 6th-11th. Meeting at Zurich.

Institute of Marine Engineers.—Tuesday, September 8th. Institute, the Minories, E.C.3. 6 p.m. Presidential address, by Mr. F. E. Rebbeck.

Institute of Metals.—September 13th-18th, Zurich. Autumn meeting.

National Radio Exhibition.—September 18th-26th. Olympia.

Royal Institution.—September 19th-25th. London. Faraday celebrations.

Institution of Electrical Engineers.—September 22nd-25th. Kingsway Hall, W.C. Summer meeting and Faraday celebrations. Royal Albert Hall. Conversazione and Faraday Exhibition.

(North-Western Students' Section).—Saturday, September 12th. 1.15 p.m. Visit to the works of Brookhirst Switchgear, Ltd., and Chester Electricity Department.

British Association.—September 23rd-30th. Centenary meeting. September 23rd. Albert Hall, 3 p.m. Inaugural meeting. Central Hall, Westminster, 9 p.m. Presidential address by Gen. the Rt. Hon. J. C. Smuts.

Electrical Power Engineers' Association.—September 26th. Holborn Restaurant, W.C. Annual dinner.

Iron and Steel Institute.—September 29th—October 1st. Swansea. Autumn meeting.

Our Service Department

Inquiries must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of the makers of the following:—

SNAPPIT iron connectors.
ELECTRIC fitting with the words Pewtal and N. & E.S.

Notes

The Iron and Steel Institute

The following papers are to be read at the autumn meeting of the Iron and Steel Institute at Swansea from September 29th to October 2nd:—

"The Equilibrium of Certain Non-Metallic Systems," Part I—By J. H. Andrew, W. R. Maddocks and D. Howat. Part II—By J. H. Andrew, W. R. Maddocks and E. A. Fowler. "Alloys of Iron Research, Part X—The Chromium-Iron Constitutional Diagram," by F. Adcock. "The Diffusion of Tin into Iron with Special Reference to the Formation of Columnar Crystals," by C. O. Bannister and W. D. Jones. "The Structure of Nodular Troostite," by N. T. Belaiew. "The Effect of Molybdenum on Medium-Carbon Steels containing 1 to 2.5 per cent. of Manganese," by G. Burns. "Production Economy in Iron and Steel Works, Part II—Costs of Production," by O. Cromberg. "The Surface Hardening by Nitrogen of Special Aluminium-Chromium-Molybdenum Steels on a Production Basis," by W. H. Cunningham and J. S. Ashbury. "The Constitution of the Iron-Tin Alloys," by C. A. Edwards, F.R.S., and A. Preece. "The Effect of Surface Conditions Produced by Heat Treatment on the Fatigue Resistance of Spring Steels," by G. A. Hankins and M. L. Becker. "The Influence of Silicon on Nickel Steel," by R. Harrison. "Mottled Tinplates," by J. C. Jones. "The Solidification and Crystallisation of Steel Ingots: the Influence of the Casting Temperature and the Undercooling Capacity of the Steel," by B. Matuschka. "A Critical Study of the Origin of the Banded Structure of a Hot-Worked Hypo-Eutectoid Steel," by F. C. Thompson and R. Willows.

A Eurythmic Kinema

Recently opened at Cambridge, the Victoria Cinema might be labelled a £100,000 piece of courage and enterprise, for it is one of the most surprising buildings of its kind. It is eurythmic inasmuch as its designer, architect, and illuminators have combined to make it a symphony of shape, colour, and tone. The lighting scheme enables the interior decorations to be altered, by the switch of a lever, in many different ways.

Mr. R. Gillespie-Williams, chief colour consultant of Holophane, Ltd., Mr. Montagu Wheeler, the architect, and Baron Arvild Rosencrantz, the Danish artist-designer of the colour scheme, have been responsible for many of the novelties. "Nothing really like it has ever been seen before," said Mr. Gillespie-Williams. "It disregards every known tradition in architectural design and colouring. We have spent two years in producing a combination of colour and shape. Every pillar, wall, and fresco is of a distinct type. Curves have been drawn with eyes shut, so that the artist should not be influenced by recalling known designs. The system of lighting, by means of large glass-covered panels in the ceiling has been so fitted in with the actual design that we can make the walls any known colour or any pattern in a second. Thus the decorations, without any preparation, can be changed to suit any scene, but the lamps used are of only three colours—red, green, and blue."

Screw-cap Lamp-holders

In our leading columns of March 13th we referred to the issue of a statement by the Home Office recommending a type of screw-cap lampholder with an insulating skirt. The Home Office has now prepared an official statement on the subject (Form 1911, H.M. Stationery Office, 1d.). In this statement it is pointed out that in the screw-type of lamp cap the screw is a conductor and many of the lampholders are of a pattern which does not afford complete enclosure for the lamp screw. This, in conjunction with a faulty arrangement of the circuit wiring, led to six fatal accidents during the year 1930.

There are several ways of arranging the wiring of a circuit for supply to a screw-cap lampholder, all of which with one exception give rise to the danger as, in a very large number of cases, circuits are controlled only by single-pole switches. and actual experience has shown that the wiring mistakes referred to are not infrequent.

It is accordingly recommended that the risk attached to the use of the screw-type of fitting should be removed by the addition of a skirt to cover the screw, so that the latter cannot be touched while it remains in engagement. The leading manufacturers are now in a position to supply lampholders of this fully skirted pattern suitable for either high candle-power reflector fittings or for individual pendants. There are, however, thousands of fittings already in use equipped with unprotected or non-skirted lampholders, and separate extension skirts have therefore been designed with a view to quick and easy fitting to these.

When electricity is used in connection with the erection of buildings it is seldom possible to arrange light-sources as permanent fixtures, and the circumstances lead to the use of portable lamps, often with screw-cap holders. The conditions in such cases render it likely that electric shock, if incurred, will be severe, and it is imperative that all portable lamps should be of the safety pattern and that, if screw-cap lampholders must be incorporated, extension skirts should be as robust as possible. It is also very desirable that the outer guards for this class of work should be of as close mesh and as strong as possible.

An exhibit showing various ways in which accidents arise in connection with screw-cap lamps, and means of preventing them, will be found at the Home Office Industrial Museum, Horseferry Road, Westminster, London, S.W.1.

Reminiscences of Faraday

Sir Alfred Yarrow, F.R.S., who is one of the two known survivors—the other being Lord Shuttleworth—of those who attended the Juvenile Lectures which Faraday delivered at the Royal Institution, has communicated his reminiscences of those lectures to *The Times*.

He refers to the kindliness and patience which Faraday exhibited towards any young people who stayed behind—often remaining for half an hour or so to answer and also to ask questions. Among the audience was to be seen our late King Edward, then Prince of Wales, with the Prince Consort and the Duke of Edinburgh.

His influence was "magnetic" and Sir Alfred relates that he frequently attended the Sandemanian Chapel in Bride Street, Barnsbury, to hear Faraday preach. The Chapel has been used as a telephone exchange since 1906. Structurally it is unaltered and on the wall over the platform is a memorial tablet to mark the position Faraday usually occupied when preaching. On the floor a brass plate indicates the spot where his pew was situated.

Transmission Line Depreciation

The Scale of Depreciation (Transmission Line Allowance) Special Order, 1931, made by the Electricity Commissioners has been confirmed by the Minister of Transport (H.M. Stationery Office, 1d. net). Under Section 12 of the Electricity (Supply) Act, 1926, it is provided that where any authorised undertakers take supplies of electricity directly or indirectly from the Central Electricity Board the price charged by them for the supply of electricity in bulk to any other authorised undertakers or for a supply for haulage or traction purposes to a railway company shall be on the same terms as those on which the undertakers receive the supplies directly or indirectly from the Board together with such charges and allowances in respect of any transmission line or part thereof used by the undertakers giving the supply in bulk for the purpose of that supply, subject to a proviso in respect of contracts made before the passing of the Act. The prescribed periods are as follows:—

Underground cables.—Forty years.
Overhead lines.—Twenty-five years.
Transformers and switchgear for the control of cables or overhead lines.—Twenty years.
Buildings or such parts thereof required to accommodate such transformers or switchgear.—Thirty years.
Leasehold interest in the land.—Period of lease or period unexpired on assignment of lease.
Clearing the site.—Period of lease unexpired at the date of clearing.

Appointments Vacant

Senior electrical installation estimator and canvasser for West Ham Electricity Department.

Electrical engineer for H.E.H. the Nizam's State Railway Board. (See our advertisement pages to-day.)

Corona Effect on Aluminium Conductors

In the May (1931) Bulletin of the Association Suisse des Electriciens, Herr von Zeerleder refutes the opinion held in various quarters that the use of aluminium for high-voltage transmission lines is dangerous owing to the ionisation resulting from the corona effect. The author states that tests which have been carried out in the Swiss Canton of Valais show that aluminium conductors are proving quite as satisfactory as those made of copper, and that moreover the same satisfactory results have been obtained in the tests carried out by the research department of the Swiss Association of Electrical Engineers

A Book About London

The London Committee of the International Illumination Congress has prepared a book entitled "A London Symphony" which is available with French and German translations for foreign visitors.

It includes 17 brief articles, each written by a well-known authority in his respective field, which give a remarkably interesting picture of London. This book in the hands of a foreigner, with the appropriate translation, should do a great deal to remove misunderstandings and call attention to some of the features of the life of the world's largest city.

There are forty-five pen sketches, and six whole page illustrations by Mr. W. James, and three interesting maps—one of the shopping district of London, one of the River Thames, and one of the world. A list of the principal English and foreign churches, theatres, museums, art galleries, &c., has been added.

Copies of this book, price 3s. 6d., are available to the public on application to the Illuminating Engineering Society, 32, Victoria Street, S.W.1; with French or German translation added the price is 4s. 6d. Proceeds from the sale of the book will be devoted to the encouragement of the science of illumination.

The book, in a modified form, will be available for members taking part in the Institution of Electrical Engineers' summer meeting this month.

New Electric Ships

Messrs. Vickers-Armstrongs have completed at their Barrow shipyard the electrically-driven steamer *Strathnaver*, and she left Barrow Docks on August 28th for Liverpool before going to the Clyde for trials. She is the biggest merchant steamer ever built at Barrow, being of 22,000 tons.

A sister ship, the *Strathaird*, is now being fitted out at Barrow Docks. They are intended for P. and O. service between London, India and Australia.

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

The *Review of the River Plate* reports that **Mr. R. G. Parrott,** in addition to his capacity as Buenos Aires manager of the Metropolitan-Vickers Electrical Export Co., Ltd., has been appointed special South American representative of Associated Electrical Industries, Ltd., to work in collaboration with the General Electric Soc. Anon., who are the South American agents for Associated Electrical Industries, Ltd., and its subsidiary companies. Railway electrification business will be handled direct by the A.E.I., Ltd.

Mr. L. A. Evans, who is in business as an electrical engineer at Weston-super-Mare, was married on August 15th to Miss G. Saunders, of Overstowey.

Mr. D. P. Morrison, the recently-appointed general manager of the Hull Corporation Tramways, took up his new duties last week. Mr. Morrison was formerly in charge of the Dundee Corporation transport undertaking. His commencing salary at Hull is £1,000 per annum.

Major R. McCreary, whose appointment as manager of the Belfast Corporation transport undertaking was reported in our issue of August 21st, was officially welcomed by Councillor J. R. Harcourt, the chairman, at last week's meeting of the Tramways Committee. Councillor Harcourt assured Major McCreary of the Committee's wholehearted support in anything which he brought forward for the good of the undertaking.

Mr. R. Taylor, the chief assistant in the Dundee Corporation Transport Department, was last week appointed manager, in succession to Mr. D. P. Morrison, at a salary to be fixed by the Lord Provost's Committee. Mr. Taylor has held the position of chief assistant since 1922 prior to which he was a Corporation committee clerk. There were 39 applicants for the position.

Mr. P. Clegg, engineer and manager of the Bingley electricity undertaking, who is leaving Bingley to take up the appointment of electrical engineer and transport manager to the Haslington Town Council, has been presented by the staff and employés at Bingley with a suitably inscribed clock.

Mr. John Lomas, electrical engineer to the Mirfield Urban District Council, is to retire in October after 26 years' service in that capacity. He went to Mirfield from Bridlington where he had supervised the electrical installation on the Princes Parade. Previous to that he was in the employ of Mr. Richmond Turner, electrical contractor, of Dewsbury, and was associated with many installations at that town before the Corporation commenced its electricity supply.

Mr. J. J. Scott, manager of Cowdenbeath Gas Co., has been appointed general supervising engineer to the British Electric Traction Co., Ltd.

Capt. P. P. Eckersley has joined the *Daily Mail* as Wireless Editor.

The Times reports that the Robert Blair Followships, given by the London County Council, in Applied Science and Technology, have been won by **Mr. John H. Chesters,** of Sheffield, and **Mr. Donald G. Reid,** Fullers Avenue, Woodford Green, Essex. Each scholarship carries a grant of £450 and is tenable for a year, during which the holders must undertake an approved advanced course of study or research in the Department and has since held positions at Hawick, with the Reid, who was educated at the City and Guilds (Engineering) College, London, and London University, proposes, during the tenure of his Fellowship, to study short-wave radio transmission developments in the United States, with special reference to inter-connection of land lines with short-wave radio links. Mr. Chesters, who is engaged with the Metropolitan-Vickers Electrical Co., Ltd., of Manchester, intends to study certain aspects of the properties of magnesite bricks.

Mr. Temple Davies, the guest at a social evening, held at the King's Head Hotel, Ogmore Vale, on August 24th, in honour of his departure to take up the position of power station superintendent at the Prince Rock power station of the Plymouth Corporation, was the recipient of an oak writing bureau suitably inscribed presented to him on behalf of the staff and employés at the electricity undertakings of Messrs. Cory Brothers & Co., Ltd., in the Ogmore, Rhondda and Resolven Valleys. Mr. Davies commenced duties at Plymouth on September 1st.

Mr. C. R. Westlake, county electrical engineer of Dumfriesshire has been appointed chief engineer and manager to the Electricity Board for Northern Ireland. Mr. Westlake commenced his training with the York Corporation Electricity Department and has since held positions at Hawick, with the Yorkshire Electric Power Co., and Bedford Corporation, culminating in his present position in which he has been responsible for the County electrification scheme involving over 800 miles of h.p. overhead lines. Mr. Westlake expects to take up his new duties towards the end of October.

Mr. and Mrs. R. Roby, of 13, Roby Street, St. Helens, celebrated their golden wedding on August 28th. Mr. Roby, who was appointed a Justice of the Peace in 1916, was for upwards of 20 years an assistant electrical engineer at the St. Helens Corporation electricity works, and he became chairman of the Liverpool section of the Electrical Power Engineers' Association.

Obituary

Alderman R. M. Elliott.—The death occurred recently of Alderman R. M. Elliott, chairman of Stockton-on-Tees Corporation Tramways Committee.

Mr. Stafford Ransome.—By the death of Mr. Stafford Ransome, consulting engineer and journalist, which occurred suddenly on August 26th at Walmer, the engineering world has lost one who was prominently concerned in its organisation interests for many years. He was born in London in 1860, and after education at Rugby, and training in various engineering works, he devoted much of his time to engineering journalism, acting in special capacities for some of our English and overseas contemporaries. He spent three years in practical engineering business abroad for Messrs. A. Ransome and Co. All of these activities led in due course to what was probably his most important piece of work, the formation in 1912 of the British Engineers' Association. As director and secretary of the B.E.A. he rendered valuable assistance to a large number of firms in the engineeering industry and prior to the war he was assiduous in his attentions to the difficult work of protecting British engineering production against the onslaughts and penetrations of the foreign competitor and in rendering assistance to them in their efforts to expand British engineering trade abroad. It will be remembered that since he relinquished that part of his activities (in 1916), the Directorship and Secretaryship of the B.E.A. has been zealously carried on by Mr. D. A. Bremner. Mr. Ransome had written many books on industrial matters, oversea engineering and other trade (South Africa, Japan, &c.), and he toured most parts of the globe as a correspondent for some of the best known London newspapers. Naturally, with authoritative knowledge of kinds such as we have indicated, Mr. Ransome found a free flow for his services in very useful channels during the war, especially at that stage when questions concerning "controlled" establishments, and the relations of industrial organisations, were uppermost in our minds at home. He was a Member of the Institution of Civil Engineers, and had passed his 70th year.

Photo by] [Elliott & Fry
Mr. Stafford Ransome

Mr. C. P. Townsend.—The death is reported from the United States of Mr. Clinton P. Townsend of the Union Carbide and Corporation. Mr. Townsend was a director of the Bakelite Corporation of Delaware and also of Bakelite, Ltd., London.

Mr. W. J. Hancock.—The death occurred on August 26th, in London, of Mr. William J. Hancock, of Perth, Western Australia, who is stated to have been the pioneer radiologist of Australia.

Mr. T. G. Casey.—The death occurred on August 19th of Mr. Thomas Gilbert Casey, late representative of the Indo-European Telegraph Co., Ltd., Teheran, Persia. He was 76 years of age.

Sir Thomas Stanton.—We regret to learn of the death, in tragic circumstances, of Sir Thomas Stanton. The body was found on the beach at Pevensey Bay, Eastbourne on August 30th, having been washed up by the sea. Sir Thomas, who was 65 years of age, was educated at Atherstone Grammar School and Owens College, Manchester. From 1891 to 1896 he was demonstrator in the Whitworth laboratory at Owen's College, and was then appointed senior lecturer in engineering at the University College, Liverpool, which post he held until 1899. From there he went to Bristol University College as Professor of Civil and Mechanical Engineering, and in 1901 joined the staff of the National Physical Laboratory, Teddington, becoming Superintendent of the Engineering Department. He retired about six months ago. While at the National Physical Laboratory he was engaged in an advisory capacity during the restoration of St. Paul's, and recommended the materials to be used and tested the effects of traffic vibrations. He became a Fellow of the Royal Society in 1914, was made C.B.E. in 1920, and was knighted in 1928.

Wills.—The late **Mr. George Fuller,** M.I.E.E., the founder of the Fuller electrical concerns, left £6,303 (£2,925 net personalty).

The late **Mr. Stanley Prest,** chairman of Parsons' Marine Turbine Co., Wallsend, and of C. A. Parsons & Co., Ltd., Newcastle, left estate valued at £85,276 (£77,731 net personalty). Having paid over to the Dean and Chapter of Durham £7,500 for establishing a charitable fund for the assistance of the education at Durham School of the sons of the clergy of the diocese, he now gives such a further sum (if not already given in his lifetime) as will make up £10,000.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered

Wilson & Ridley, Ltd.—Private company. Registered August 26th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical engineers, contractors, wireless manufacturers and agents, formerly carried on by G. G. Wilson as Wilson & Ridley, at 4, St. Mary's Place, Newcastle-on-Tyne. The directors are: G. G. Wilson, electrical engineer (chairman), and Mrs. B. E. J. Wilson, 7, Park Head Road, Newcastle-on-Tyne. Registered office: 4, St. Mary's Place, Newcastle-on-Tyne.

McEwan & Co. (Brighton), Ltd.—Private company. Registered August 26th. Capital, £500 in £1 shares. Objects: To carry on business as electrical and wireless dealers and factors, &c. The directors are: D. W. McEwan, radio factor, and Mrs. M. McEwan, 67a, Denmark Villas, Hove. Registered office: 10, Pavilion Parade, Brighton.

British National Electrics, Ltd.—Private company. Registered August 22nd in Edinburgh. Capital, £25,000 in £1 shares. Objects: To carry on the business of designers, manufacturers and factors of and dealers in electrical or other fires, radiators, stoves and allied appliances, &c. The directors are: J. Colville, Braidwood House, Carluke, Lanarkshire, steel company director; J. Jardine, Bickleigh, Uddingston, Glasgow, engineer; G. Laird, Langton, Denton Road, Eastbourne, Sussex, electrical engineer; J. M. Colville, Fernhill, Rutherglen, Glasgow (director Clyde Crane Co., Ltd.). Secretary: W. M. Marshall. Registered office: Clyde Crane Works, Mossend, Glasgow.

Selectors (1931), Ltd.—Private company. Registered August 25th. Capital, £1,000 in £1 shares. Objects: To carry on the business of makers and retailers of and dealers in wireless sets, apparatus and component parts, mechanical and electrical engineers, &c. The first directors are: T. Hall, Wingrove, Corbridge-on-Tyne, solicitor (director of Harris Williams (Servis), Ltd.); D. Morris, The Hollies, Chislehurst, Kent, solicitor. Registered office: 22, Charterhouse Square, E.C.1.

J. Browett Lindley (1931), Ltd.—Private company. Registered August 27th. Capital, £100 in £1 shares. Objects: To carry on the business of mechanical, electrical and water supply engineers, &c. The subscribers (each with one share) are: M. Lewis, 100, Sandringham Road, Watford, clerk; L. Tomlinson, 78, Broadway, Cricklewood, N.W.2, clerk. Secretary (pro tem): B. V. Roberts. Solicitors: Harris, Cheetham & Cohen, 6, Stratford Place, W.1.

Beechwood Conveyor Co., Ltd.—Private company. Registered August 27th. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, mechanical and general engineers, manufacturers of and dealers in elevating machinery of all kinds, &c. The directors are: R. G. Hancock, 65, Great Northern Road, Dunstable, Beds., engineer; J. W. Thorpe, 20, Priory Road, engineer; P. G. Bond, 316, Dunstable Road, Luton. Secretary: J. W. Thorpe.

K. L. M. Radio Relays, Ltd.—Private company. Registered August 27th. Capital, £5,000 in £1 shares (4,500 8 per cent. cumulative preference and 500 ordinary). Objects: To establish and maintain a service for the relaying of radio programmes to subscribers and others in Kendal, Lancaster and Morecambe, and to adopt agreements (1) between the Borough of Kendal and Rediffusion, Ltd., and (2) between the Borough of Lancaster and Rediffusion, Ltd. The directors are: W. S. Lee, Brooklyn, Gilling Gate, Kendal; E. N. Haines, Castle Lodge, Kendal, radio engineers. Registered office: 12, King Street, Lancaster.

Spear Point Radio Works, Ltd.—Private company. Registered August 27th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in goods connected with wireless telegraphy, telephony and television, &c. The subscribers (each with one share) are: Mary Parker, 52, Revelstoke Road, Southfields, S.W.18, clerk; Muriel Carver, 4, Endersleigh Gardens, Hendon, N.W.4, clerk. Registered office: 91, Great Russell Street, W.C.1.

Maxim Lamps, Ltd.—Private company. Registered August 27th. Capital, £2,000 in 1,000 10 per cent. cumulative preference shares of £1 and 20,000 ordinary shares of 1s. each. Objects: To carry on the business of manufacturers of and dealers in electric and other lamps, radio valves, &c., to adopt an agreement with Poynter, Griffiths & Co., Ltd., for the acquisition of the trade mark "Maxim." The subscribers (each with one preference share) are: W. J. Chivers, 24, Byton Road, S.W.17, clerk; Doris Evans, 24, Skelton Road, Forest Gate, E., stenographer. Solicitor: Peter Thomas, 20, Kingsway, W.C.2.

Allenby & Stokell (Birmingham), Ltd.—Private company. Registered August 27th. Capital, £800 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, manufacturers of and dealers in electrical or mechanical equipment, wireless appliances, &c. The subscribers are: G. W. Allenby, 20, Hawkesworth Road, Horsforth, near Leeds; P. G. Farthing, 23, Snow Hill, Birmingham, electrical engineers. Secretary: P. G. Farthing.

Radiomains, Ltd.—Private company. Registered August 24th. Capital, £600 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and dealers in loud-speakers, amplifiers, wireless apparatus, &c. The subscribers (each with one share) are: A. A. Hunter, 9, Reydon Avenue, Wanstead, E.11; W. Loveless, 49, Lynton Road, New Malden, Surrey. Solicitors: Wm. Easton & Sons, 43, London Wall, E.C.2.

Wireless Services, Ltd.—Private company. Registered August 21st. Capital, £5,000 in £1 shares. Objects: To finance electrical and wireless undertakings of all kinds, to provide capital for and to hold stock, shares, debentures, &c., of companies formed for working and developing the wireless trade; and to carry on the business of merchants, manufacturers and distributors of goods and merchandise of all kinds, &c. The directors are: W. P. E. Darwen, Windela, White Rose Lane, Woking; F. Brown, 6, Deans Combe Gardens, N.21. Registered office: 4, New Burlington Street, W.1.

Electrical & Radio Products (1931), Ltd.—Registered as a public company, August 18th. Capital, £20,924 in 436,960 7½ per cent. non-cumulative redeemable preference shares of 6d. each and 40,000 ordinary shares of 5s. each. Objects: To acquire the undertaking and all or any of the property and assets of Electrical and Radio Products, Ltd., and to carry on the business of manufacturers of and dealers in radio instruments and apparatus, gramophones, radio-gramophones, valves, electrical, magnetic and radio-active instruments and switchboards, &c. Purchase consideration: £21,575 (£7,350 cash and £14,225 debentures, approximately). The first directors are: Col. J. Williams, C.B.E., 779, Salisbury House, E.C.2; J. L. Gottlieb, 10, Hillcrest Avenue, Golders Green, N.W.; H. A. Gottlieb, Moorgate Station Chambers, E.C.2. Registered office: 90, Regent Street, W.1.

Lancashire Electric Lamp Co., Ltd.—Private company. Registered August 29th. Capital, £500 in £1 shares. Objects: To carry on the business of wholesale or retail dealers in electric lamp bulbs, fittings and accessories; wireless, lighting, heating, ventilating and power engineers, &c. The subscribers are: L. Black, 110, Falkner Street, Liverpool, and H. Beilin, 102, Eversley Street, Princes Road, Liverpool. L. Black is the first director. Registered office: 6, Colquitt Street, Liverpool.

Surrey Cables, Ltd.—Private company. Registered August 29th. Capital, £1,000 in £1 shares. Objects: To carry on business as manufacturers of and manufacturers' agents for motor, electrical and ignition appliances and accessories, &c. The directors are: A. A. Pitcairn, Bellair, 30, Stanley Road, Sutton, and G. A. Roberts, 65, Norman Avenue, N.22. Registered office: 56, Victoria Street, S.W.1.

Trippe Safety Speed Light Co., Ltd.—Private company. Registered August 29th. Capital, £1,000 in 500 10 per cent. cumulative preference shares of £1 each and 10,000 deferred shares of 1s. each. Objects: To carry on the business of manufacturers of and dealers in illuminating appliances of all kinds for lighting motor cars, marine vessels, &c. The directors are: A. P. Jones (chairman), 35, Norton Street, Liverpool, Mrs. Dorothy M. Jones, 2, West Albert Road, Liverpool, and E. Bennett (managing director), 35, Norton Street, Liverpool. Secretary: R. E. Bell. Registered office: 35, Norton Street, Liverpool.

Boiler House Sundries, Ltd.—Private company. Registered August 31st. Capital, £100 in £1 shares. Objects: To carry on the business of consultants and manufacturers of and dealers in power and heating plant (including steam and electrical), &c. The directors are: L. E. T. Branch, 15, The Crescent, Ilford, Essex, and F. Squirrell, 14, Caxton House, Westminster, S.W.1. Secretary: F. Squirrell. Registered office: 14, Caxton House, Tothill Street, Westminster, S.W.1.

Portsmouth Central Wireless Co., Ltd.—Private company. Registered August 31st. Capital, £1,000 in £1 shares. Objects: To acquire the business of dealer in and manufacturer of wireless apparatus and component parts, carried on by Mrs. M. A. Lamb, at 117, New Road, 67, 69 and 299, Lake Road, Portsmouth, and elsewhere, as "Central Wireless." The permanent directors are: H. W. Lamb and Madeline A. Lamb, both of 117, New Road, Portsmouth.

Tom Smith and Clarke, Ltd.—Private company. Registered July 25th. Capital, £500 in £1 shares. Objects: To carry on the business of mechanical, electrical and consulting engineers, manufacturers of, agents for and dealers in all kinds of steam, electric, hydraulic, pneumatic or other machinery, &c. The subscribers are: M. T. Smith, 16, Hawthorne Avenue, Swansea, commercial traveller; M. H. Clarke, "Eirianfa," Newton, Mumbles, Swansea, commercial traveller. M. H. Clarke signs documents as director. Secretary: M. H. Clarke.

Returns of Electrical Companies

Tees Power Station Co., Ltd.—Satisfaction to the extent of £397,900 on various dates between July 10th, 1930, and August 7th, 1931, being balance of £600,000 issued, of debentures authorised by trust deed dated May 7th, 1918, and registered May 24th, 1918, securing £1,000,000, the remaining £400,000 never having been issued.

Devereux, Ltd. (old company).—Satisfaction on August 7th, 1931 (1) of debenture dated June 13th, 1931, and registered July 3rd, 1931, and (2) of agreement by way of further charge dated July 9th, 1931, and registered July 11th, 1931. (According to the register of mortgages, the debenture registered July 3rd, 1931, originally secured £20, and the agreement by way of further charge, registered July 11th, 1931, originally secured £65.)

Veritys, Ltd.—Satisfaction to the extent of £100 on July 30th, 1931, and to the extent of £2,000 on August 11th, 1931, of second debentures authorised April 13th, 1931, and registered April 28th, 1931. (According to the register of mortgages, the debentures registered April 28th, 1931, originally secured £60,000.)

Issue on July 30th, of £100 and on August 11th, 1931, of £2,000 debentures, parts of a series already registered.

Percy C. Holmes (Engineers), Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated August 18th, 1931, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

Telegraph Condenser Co., Ltd.—Capital, £5,000 in £1 shares. Return dated June 18th, 1930 (filed April 10th, 1931.) 2,000 shares taken up. £2,000 considered as paid. Charge (dated July 8th, 1930) to Westminster Bank, for unspecified amount.

Amalgamated Lamp Companies (Great Britain), Ltd.—Capital, £600 in £1 shares (300 preference and 300 ordinary). Return dated November 17th, 1930 (filed July 3, 1931). All shares taken up. £301 paid. £299 considered as paid. Mortgages and charges, nil.

Rural Electricity Supply Co., Ltd.—Capital, £10,000 in 9,500 preferred shares of £1 each and 10,000 deferred shares of 1s. each. Return dated September 13th, 1930 (filed March 2nd, 1931). 5,512 preferred and 5,713 deferred shares taken up. £3,156 13s. paid, being £1 per share on 2,871 preferred and 1s. per share on 5,713 deferred. £2,641 considered as paid on 2,641 shares. Mortgages and charges, nil.

Vac-Tric, Ltd.—Capital, £4,000 in 202 "A" shares of 10s. and 3,899 "B" of £1 each. Return dated December 31st, 1930 (filed April 22nd, 1931). 202 "A" and 1,903 "B" shares taken up. £2,004 paid on 202 "A" and 1,903 "B." Mortgages and charges, nil.

C.A.C. Valve Distributing Co., Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1930 (filed May 11th, 1931). All shares taken up. £2 paid. £98 considered as paid. Mortgages and charges, nil.

London Radio Co. (Leeds), Ltd.—Capital, £1,000 in £1 shares. Return dated September 26th, 1930 (filed May 15th, 1931). All shares taken up. £20 paid. £980 considered as paid. Mortgages and charges, nil.

Atmos Electrical Co., Ltd.—Capital, £2,000 in £1 shares (1,000 ordinary and 1,000 preferred). Return dated April 21st, 1930 (filed May 7th, 1931). 750 shares taken up. £750 paid. Mortgages and charges, nil.

Palmer's Green Radio Service, Ltd.—Capital, £100 in £1 shares. Return dated December 31st, 1930 (filed May 11th, 1931). Two shares taken up. £2 paid. Mortgages and charges, nil.

William Johnson & Co. (Sheffield), Ltd.—Capital, £2,500 in £1 shares. Return dated December 31st, 1930 (filed May 15th, 1931). 2,025 shares taken up. £1,025 paid and £1,000 considered as paid. Mortgages and charges, nil.

Tyrela Radio, Ltd.—Particulars filed of debentures for sums not exceeding £10,000 authorised July 30th, 1931, charged on the company's property, present and future, including uncalled capital, the amount of the present issue being £5,000.

Thorpe & Thorpe, Ltd.—Capital, £100 in £1 shares. Return dated May 11th, 1931. 95 shares taken up. £95 paid. Mortgages and charges, nil.

Bere Alston & District Electric Supply Co., Ltd.—Capital, £7,000 in £1 shares. Return dated April 6th, 1931. 2,009 shares taken up. £2,000 5s. paid, leaving £8 15s. in arrears. Mortgages and charges, nil.

Pirelli, Ltd.—Capital, £400,000 in £1 shares. Return dated March 9th, 1931. All shares taken up. £400,000 paid. Mortgages and charges, nil.

Electroservice, Ltd.—Capital, £100 in £1 shares. Return dated April 10th, 1931. 100 shares taken up. £100 paid. Mortgages and charges, nil.

Birmingham Electric Furnaces, Ltd.—Capital, £1,000 in £1 shares. Return dated April 10th, 1931. All shares taken up. £1,000 paid. Mortgages and charges, nil.

H. P. Eyers & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated February 28th (filed March 12th), 1931. 502 shares taken up. £2 paid. £500 considered as paid. Mortgages and charges, nil.

Reilly & Brookes, Ltd.—Capital, £2,500 in £1 shares. Return dated November 8th, 1930 (filed July 27th, 1931). 2,000 shares taken up. £2,000 paid. Mortgages and charges: £500.

A. C. Wells & Co., Ltd.—Debenture dated August 14th, to secure £2,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. McCulloch, Rossie, Gloucester Road, Kingston Hill.

A. H. Whitehead & Co., Ltd.—Debenture dated August 19th, to secure £300, charged on the company's property, present and future, including uncalled capital. Holder: A. H. Whitehead, 92, Upper Brook Street, Manchester.

British Electric Pari Mutuel, Ltd.—Capital, £500 in £1 shares. Return dated January 14th, 1931 (filed May 1st, 1931). All shares taken up. £500 paid. Mortgages and charges, nil.

Gayton Park Electricity Co., Ltd.—Capital, £3,000 in £1 shares. Return dated October 1st, 1930 (filed August 4th, 1931). 3,000 shares taken up. £3,000 considered as paid. Mortgages and charges, nil.

Helsby Cables, Ltd.—Capital, £2 in £1 shares. Return dated April 3rd, 1931. All shares taken up. £2 paid. Mortgages and charges, nil.

W. A. Rood, Ltd.—Capital, £800 in £1 shares (100 ordinary and 700 preference). Return dated January 14th, 1931 (filed April 2nd). 100 ordinary and 433 preference shares taken up. £433 paid on 433 preference. £100 considered as paid on 100 ordinary. Mortgages and charges (as date of return), nil. Registered since date of return: Charge for £450 any other moneys to become due to the mortgagees.

British Curtis Radio, Ltd.—Capital, £2,500 in £1 shares. Return dated December 31st, 1930 (filed May 5th). 2,000 shares taken up. £2,000 paid. Mortgages and charges, nil.

Eric J. Lever (Trix), Ltd.—Capital, £6,000 in £1 shares. Return dated May 24th, 1930 (filed April 7th, 1931. 6,000 shares taken up. £2,000 paid. £4,000 considered as paid. Mortgages and charges, nil.

W. E. Dove & Co., Ltd.—Capital, £3,500 in £10 shares. Return dated March 9th, 1931. 320 shares taken up. £2,080 paid, £1,200 considered as paid. Mortgages and charges: £800.

City Notes

Companies to be Struck Off the Register

The names of the undermentioned companies will be struck off the Register at the expiration of three months, unless cause is shown to the contrary:—

Electrical Automatics, Ltd.
Lattin Electrical Products, Ltd.
Regal Radio, Ltd.
Syrophone Radio Co., Ltd.
Bell Electrical Co. (Northern), Ltd.
Chagford and Devon Electric Light Co., Ltd.
Nelson Electric Co., Ltd.

The International Paper & Power Co. reports a net revenue, including other income, for the quarter ended June 30th last of $10,488,226, and a net revenue for the first six months of the current year of $20,483,458 (as compared with $20,747,491 for the corresponding period of 1930). After providing for depreciation, &c., $5,896,575 are available for dividends. Dividends on the stocks of subsidiaries absorb $4,289,578, and the payment on the preferred stock of the International Co. accounts for $1,197,347. No distribution is made on the class "A" common stock.

International Hydro-Electric System reports consolidated gross revenue for the second quarter of 1931 of $12,378,540, as compared with $12,163,120 in the second quarter of 1930. After all prior charges, including depreciation, &c., consolidated earnings available for dividends on the class "A" stock were $497,647 (against $622,368). In the twelve months ended June 30th, consolidated gross revenue was $50,673,960, as compared with $49,808,828 in the preceding twelve months. Consolidated earnings, available for dividends on the class "A" stock, were $2,795,930, as compared with $3,351,203.

L. Gardner & Sons, Ltd., have announced a six months' dividend at the rate of 6 per cent. per annum, less tax, on the 7 per cent. preference shares to December 31st, 1925. In the previous half-year, the payment was at the rate of 7 per cent. per annum.

The Killamarsh and District Electric Supply Co., Ltd., shows a profit for the year of £203. It is proposed to pay a dividend of 4 per cent. for the year and to carry forward £50, against £86 brought in.

The Rangoon Electric Tramways & Supply Co., Ltd., has announced an interim dividend of 6 annas per share, free of Indian tax, on the ordinary shares (against 8 annas).

The British Columbia Power Corporation, Ltd., has announced a dividend of 50 cents per share on class "A" shares for the quarter ending September 30th (same).

The Pennsylvania Water & Power Co. has declared a dividend of $\$\frac{3}{4}$ on the common shares for the quarter ending September 30th (same).

The American Telephone and Telegraph Co. has declared a quarterly dividend of $2.25 (same).

The Brazilian Traction Light & Power Co., Ltd., has declared a quarterly dividend of 1½ per cent. on the preference shares.

Stocks and Shares

TUESDAY EVENING.

THE acute excitement in the political world has died down to some extent, and the establishment of further substantial credits by this country in America and in France has served to dispel some, at any rate, of the anxiety with which investors had come to view the immediate outlook. There seems to be no doubt that the Budget next April will be duly balanced, although at what cost to the individual citizen has yet to be made clear. One automatic result in the Stock Exchange of increased taxation is to lower prices of gilt-edged securities, and, in fact, to affect unfavourably practically everything in which the public have invested money, in that it leaves the ordinary person with less to spend in the purchase of stocks and shares, and also, it restricts the area of business as a whole. This influence is casting its shadow upon British Government stocks and others of similar nature. Prices are very flat: there is little support to counteract the effect of heavy realisations of gilt-edged securities.

Gilt-Edged Stocks

The 4½ per cent. debenture stocks of the London & Home Counties J.E.A. and of the Central Electricity Board have come to a common price of 96½, showing a return on the money of £4 13s. 3d. per cent. This, it may be mentioned, is, roughly speaking, about the same yield as can be obtained from British Government securities other than the 5 per cent. War Loan. The comparative steadiness of these two prices testifies to the confidence which proprietors maintain in the security in their stocks. Home Railway prior-charge issues are weak. One of the Metropolitan District debenture stocks, the 6 per cent., with January and July interest payments, can be bought at 120 or a little less, to yield 5 per cent. on the money. London Electric debenture stocks are on offer at prices which give the same return. Metropolitan Railway preferences can be bought to yield £5 13s. per cent. The Government-guaranteed stocks of the Central London and City & South London both stand about 98¾. Small amounts of stock are on offer in each case, the yield on the money being £4 11s. per cent., and the interest payments due in January and July. A return of £4 17s. 6d. per cent. is available from £10,000 London Power 5 per cent. debenture which can be bought at 102¼.

Home Railway Traction

Metropolitan consolidated is back to 36¼, and Districts are lower at 59¼ in sympathy with the weakness which developed in the market as a whole. Central London assented stocks are

quoted ex dividend, but no changes have occurred in the prices, all of which—the ordinary, preferred ordinary, and deferred ordinary—are called 75 middle. London Electric ordinary remains at 61¼, and Underground Electric ordinary shares have weakened to 19s. Several of the prior charge stocks in this group have lost a point apiece. London United Tramway debenture shed 2 points, going back to 61¼. The 5 per cent. preference shares are quoted at 3s. 6d., and the 5 per cent. preference of the London & Suburban Traction Company at 12s. The latter company's ordinary shares last changed hands at 6d.

Home Electricity Shares

Home electricity shares are steady, but show no outstanding feature. Electric Supply Corporation at 2⅛ show ⅛ loss. In the Scottish list, Clyde Valleys are easier at 30s. 9d., and Scottish Power can be bought at 27s. Kensington 4 per cent. debenture has hardened to 82¼.

No little interest has been aroused by the illumination this week of City and West End buildings under a system of floodlighting which serves to advertise, as nothing else could do, the effects which can be obtained from this plan. Although financed by private enterprise—and probably very few of the companies will draw any material advantage from the power and light supplied—the indirect advantage of the advertisement can hardly fail to be considerable. Those whose business lies within the one square mile will probably ask for an extension of the illumination beyond the two days that are set aside on the Tuesday and Wednesday in this week for the City display, although the West End offers, of course, the greater scope for floodlighting artistry.

Manufacturing and Equipment

The depression which overtook the market in shares of electrical manufacturing and equipment companies during July has continued. Prices remain weak, and it is suggested that this may be on account of an impression that, under a national economy campaign, the extension of the Grid system may suffer some check, which in its turn would reflect upon the volume of business handled by the companies concerned in it. Moreover, the general tendency of profits to diminish is not lost upon proprietors of stocks and shares in these manufacturing companies, the result being that the usual supporters of the market are holding their hands and leaving prices somewhat at the mercy of the selling which goes on more or less continuously by reason of deceased accounts, &c. Henley's are ¼ down at 4¾: the company's 4½ per cent. preference have recovered the dividend deducted last week in the price. General Electrics are back to 40s., and Siemens to £1. British Insulated and Callender's have each lost 2s. 6d.

Cables and Wireless

After the recovery which took place last week in the stocks of the Cables & Wireless merger, the reaction which has since occurred is the more disappointing to stockholders, who are still without any confirmation in regard to the report that the British Post Office may take over the Imperial & International Communications system. Cables & Wireless preference has gone back to 47½, and both the ordinary stocks have eased off. American Telephone & Telegraph, at 180, has recovered its 5 points rise of last week, and Internationals, at 29, are unchanged. The president of the American Telephone and Telegraph Company has been appointed by Mr. Hoover to head a committee on poor relief in the United States. This is taken to indicate that America is determined to avoid if possible the institution of a dole system. Great Northern Telegraphs are £1 lower at 24. Globe Telegraph preference at 7½ have lost 10s.

South Americans Flat

The announcement by the Brazilian Government that on the majority of its external loans the sinking fund attached to the bonds is to be suspended, has come as a shock to those who had justifiably regarded Brazil as on the point of turning the corner of her financial difficulties. The immediate result was a heavy fall in Brazilian Government bonds, and the weakness spread, although to a minor extent, amongst bonds of the Brazilian utility companies. Rio Tramway 5 per cent. first mortgage bonds are lower at 96½, and the 5 per cent. second mortgage bonds at 84½. San Paulo Tramway 5 per cent. debenture stock is quoted nominally at 80. These changes are of slight consequence, but it has become more difficult, naturally, to sell the bonds than was previously the case. Brazilian Tractions have gone back 2¼ to 16. Other South American stocks are flat. The price of Anglo-Argentine Tramways first preference is called 7s. 6d. middle, showing a fall of 2s. 6d. on the week. Business was done on Monday in the shares at 7s. 9d. and at 5s. The price of the second preference is marked down to 6s. 3d. The 5 per cent. debenture stock is left nominally at 18 middle. Light & Power preferred, at 50½, has fallen 2.

Miscellaneous Matters

The iron and steel market, after a five minutes' boomlet on circulation of a report, subsequently denied, that Mr. Snowden had resigned from the present Cabinet, went back, and Vickers, to take one example, are 1s. lower at 6s. 6d. The rubber market is in a sorry plight, but efforts are being made by various groups to introduce some scheme whereby the industry may be rescued from its parlous condition. Atlas ordinary shares have gone back to 14s. 9d. The preference are quoted at 23s. 3d.

Share List of Electrical Companies

HOME ELECTRICITY COMPANIES

	Nom.	Approx. Dividend 1929.	1930.	Price Sept. 1 1931.	Rise or fall.	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	58/9	—	5 2 0
Brompton Ordinary	1	8½	8½	28/6xd	+1/16	4 18 3
Central Electricity 4½% Deb. ...	Stock	—	4½	96½	—¼	4 13 3
Charing Cross Ordinary	1	8½	8½	30/6	—	4 11 10
Chelsea	1	8⅝	8⅝	28/-	—	5 0 0
City of London	1	10	10	37/-	—	5 8 1
Clyde Valley	1	8	8	30/9	—1/9	5 4 1
County of London	1	11	11	45/-	—	4 17 9
Edmundsons' 7% Pref.	1	7	7	26/-	—	5 7 8
Elec. Supply Corporation	1	11	11	42/6	—2/6	5 3 6
Kensington Ordinary	1	8	8	29/6	—	4 15 0
Lancs. Light and Power	1	7	6½	21/3	—	6 2 4
London & Home Counties 4½% Deb.	Stock	—	—	96½	—	4 13 3
London Electric	1	8½	9	33/6xd	—	5 7 6
Metropolitan	1	9	10	2⅛	—	4 18 9
Midland Counties	1	6½	7	27/-	—6d.	5 3 8
* Mid. Elec. Power	1	15	8	28/3	—	5 18 3
Newcastle-on-Tyne Ordinary ...	1	6	6	21/3	—9d.	5 13 0
do. 7% Pref.	1	7	7	27/6	—	5 1 10
Notting Hill 6% Pref.	10	6	6	11½	—	5 6 9
North Met. Elec. 6% Pref.... ...	1	6	6	24/-	—	5 0 0
St. James' and Pall Mall	1	8	8	29/6	—	4 13 0
Scottish Power	1	8	8	27/6	—	5 16 3
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	28/3	—	4 19 1
Westminster Ordinary	1	8½	8½	29/6	—	4 15 0
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	25/-	—3d.	6 0 0
Yorkshire Elec.	1	8	8	30/-	—9d.	5 6 8

HOME RAILS

Central London Ord. Assented ...	Stock	4	4	75xd	+2	5 6 8
Metropolitan	,,	4	3½	36½	—½	9 11 9
do. District	,,	5		59½	—1	8 8 0
Underground Electric	£1	8	8	19/-	—6d.	8 8 6

TELEGRAPHS AND TELEPHONES

Anglo-Am. Tel. Pref....	Stock	6	6	103	—	5 17 8
do. Def-	,,	1½	1½	25	—	6 0 0
Cables & Wireless 5½% Pref. ...	Stock	5½	5½	47½	—2	... ...
do. A 7½% Ord.	,,	Nil	—	13	—2	... ...
do. B Ord.	,,	Nil	—	7	—1	... ...
Globe Tel. and T. Ord.	10	10	8½	6	—	... ...
do. do. Pref.	10	6	6	7½	—½	8 0 0
Great Northern Tel.	10	20	20	24	—1	8 6 8
Marconi-Marine	1	15	15	30/-	—	10 0 0
Oriental Telephone Ord.	1	12	12	2½	—1/16	*5 12 11

HOME AND FOREIGN TRAMS, &c

Anglo-Arg. Trams First Pref. ...	5	5½	—	7/6	—¼	... ...
do. do. 2nd Pref. ...	5	6	—	6/3	—1/16	... ...
do. do. 5% Deb. ...	Stock	5	5	18	—	... ...
British Electric Traction Def. Ord.	,,	5	5	775	—	... ...
do. do. Pref. Ord. ...	,,	8	8	122½	—2	6 10 9
Brazil Traction	100	8	—	16	—2¼	... ...
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	96½	—	5 3 3
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	12/-	—	... ...
London United Tram Deb. ...	Stock	4	4	61¼	—2	6 10 0
Mexico Trams, 5% Bonds	—	5	5	31½	—	15 17 6
Mexican Light Common	100	Nil	Nil	25	—	... ...
do. 7% Pref.	100	7	7	50½	—2	13 17 2
do. 1st Bonds	—	5	5	62½	—	8 0 0
Victoria Falls Ord.	1	15	15	57/6	—	5 4 4
Yorkshire (West Riding)	1	Nil	Nil	6/3	—	... ...

MANUFACTURING COMPANIES

Assoc. Elec. Ord.	1	6	6	20/-	—	6 0 0
do. Pref.	1	8	8	28/3	—	5 12 3
Babcock & Wilcox	1	15	14	42/-	—1/9	*6 13 4
British Aluminium Ord.	1	10	10	24/6	—6d.	8 3 4
British Insulated Ord.	1	15	15	2⅞	—⅛	5 17 0
Brush Ord.	Stock	10	5	60	—	8 5 0
Callenders	1	15	15	2⅜	—⅛	6 6 4
do. 6½% Pref....	1	6½	6½	26/3	—	4 19 1
Crompton Parkinson Ord.	5/-	30	30	1	—	7 10 0
do. 8% Pref.	1	8	8	28/3	—	5 12 3
Edison-Swan 1st Pref.	1	7½	7½	23/3	—	6 9 0
do. 5% Deb	Stock	5	5	99½	—	5 8 1
Electric Construction ...	1	5	Nil	10/-	—	... ...
Enfield Cable Ord.	1	25	25	3¼	—	6 8 10
English Electric	1	Nil	Nil	5/-	—	... ...
do. do. Pref.	1	Nil	Nil	5/-	—	... ...
Ferranti Pref.	1	7	7	20/6	—	6 18 3
G.E.C. Pref.	1	6½	6½	25/6	—	5 2 0
do. Ord.	1	14	10	40/-	—9d.	5 0 0
Henley	1	30	30	4¾	—¼	6 10 5
do. 4½% Pref.	5	4½	4½	4¾xd	+1/10	5 2 10
India-Rubber	1	Nil	Nil	4/6	—	... ...
Johnson & Phillips	1	10	10	28/9	—	6 19 2
Siemens Ord.	1	7½	7½	39/-	—9d.	7 10 0
Telegraph Construction	12	10	7½	9½	—	9 9 8

*Dividends paid free of Income Tax.

The Brazilian Machinery Market

A German Investigation

OWING to the great interest which German machinery manufacturers take in the Sao Paulo market. *Industrie und Handel* (Berlin) has instituted a special inquiry into the present prospects for the sale of plant. The following is a summary of the results of this investigation.

Sao Paulo, which is the most highly industrialised State of Brazil, is one of the most competitive markets for manufactured and semi-manufactured goods on the South American Continent. The principal suppliers, at present, as before the war, are Germany, Great Britain, and the United States, but with this difference, that whereas formerly the United States took third place, it now heads the list.

Great Britain's Activities

Great Britain has been making great efforts to recover her position, by means, for example, of the visits of the Prince of Wales, the d'Abernon Mission, the Sheffield Cutlers, and the Lancashire "Whitworth Scholars." A further trade mission is said to be going to Brazil—particularly Sao Paulo—in October or November consisting of about 100 heads and representatives of firms in various branches. The object of this mission is not only market investigation and propaganda but also to study the question of establishing branch factories. (Presumably the last-named mission refers to the Exhibition Ship which is about to visit various South American ports.)

Apparently the North American concerns are not much disturbed about this great renewal of activity on the part of the British, and are adopting a waiting attitude, probably because they think that political stability has not yet been reached in Brazil. They will, however, be on the spot when the time comes and meanwhile they are preparing the ground. For example, the United States Consulate has sent to firms in Sao Paulo, both American and foreign, a questionnaire, with a request for a prompt reply, covering such points as: Openings for the sale of American goods, qualities, prices, conditions of supply, requirements of customers, hints regarding improvements in design, &c.

The Position of German Suppliers

Germany must keep an eye on these two competitors—Great Britain and the United States—as the most important and dangerous, and must keep pace with their advance, adopting their methods where they are suitable.

The confidence in German manufactures, and especially machinery, which formerly existed is now beginning to revive, after the interruption of the War. The word "machinery" in this connection covers apparatus, implements, motors, machine tools, and commercial vehicles of all kinds, including complete plants for lighting, hydro-electric and turbine installations, machines and equipment for sugar mills, plant for producing alcohol from sugar, oil machinery, boring machines, and sanitary fittings.

While German machinery is regaining its old reputation, it is the opinion of people in the trade in Brazil that the sale of American mass-production articles is dwindling. In the case of machine tools and fairly small machines and motors, which are not subject to any great strain, the low prices of the American makes will continue to prove attractive, but in the case of bulkier goods and machinery which should possess great powers of resistance, and particularly apparatus with which precision is required, the Brazilians prefer German or British products. At the same time the German machine, on account of its relative cheapness combined with good quality, often has the advantage over the more solidly constructed and durable British article. The only Swiss and Belgian machinery which competes to any noticeable extent in Sao Paulo consists for the most part of wood-working machinery, locomotives, motors (Belgian), weaving looms, lorries (Saurer) and turbines (Switzerland, &c.). Czecho-Slovakia is also an important rival.

Some Import Details

Official detailed statistics of the imports into Santos, the port for Sao Paulo, are not available later than 1929, at any rate giving countries of origin. Some leading figures of interest to electrical manufacturing and allied firms are given below:—

	Milreis 1928	1929
Machine tools, &c.—		
United States	4,475,000	4,171,000
Germany	2,524,000	2,990,000
Great Britain	1,067,000	1,341,000
Machines and apparatus for cinemas—		
United States	69,800	643,000
Germany	162,000	120,000
Electrical machinery and apparatus—		
United States	13,650,000	15,182,000
Germany	3,705,000	4,129,000
Great Britain	2,341,000	2,919,000
Sweden	986,000	1,515,000
Radio apparatus and accessories—		
United States	949,000	1,302,000
Germany	164,000	587,000
France	8,400	40,000
Dynamos and generators—		
United States	765,000	1,704,000
Germany	560,000	690,000
Switzerland	32,000	205,000
Electric irons—		
United States	59,500	452,000
Germany	216,000	230,000
Electric motors—		
United States	2,224,000	1,797,000
Germany	1,225,000	1,202,000
Belgium	340,000	885,000
Great Britain	409,000	873,000
Italy	301,000	406,000
Transformers—		
United States	2,813,000	4,279,000
Great Britain	530,000	1,365,000
Germany	709,000	930,000
Sweden		
Internal combustion engines—		
Germany	261,000	2,178,000
Sweden	486,000	524,000
Great Britain	302,000	311,000
United States	145,000	180,000

(Milreis = 3d.)

The Requirements of the Market

The conclusion drawn from the foregoing figures is that the prospects for the sale of German machinery in the Sao Paulo market are more or less favourable, provided that her exporters of these goods do not lag behind their foreign competitors in the matter of sales organisation and especially in the terms of payment offered.

Admittedly, however, difficulties have to be overcome, the foremost being the industrial depression which now weighs upon Brazil, and notably Sao Paulo, while the second difficulty lies in various lapses and mistakes which, it is said, have been made by the Germans in their selling campaigns.

With regard to the industrial depression, a turn for the better appears to be in sight, judging by the statistics of unemployment. As a result of the fall in the milreis, combined with increased import duties, activity in the Sao Paulo factories has recently increased. But it cannot be said that prospects in the immediate future are at all certain, chiefly because of political instability.

As to the question of sales organisation, the methods of the Americans are praised, in so far as the advice of the local representatives is taken; the head of the firm himself visits Sao Paulo and appoints a suitable agent, backs him financially in his advertising campaigns, provides him with liberal stocks and quantities of spare parts in case of need; and, generally, the head office or factory keeps in close and sympathetic communication with the local organisation. The Germans, on the other hands, are disinclined to make liberal or even adequate allowances for expenses to their Brazilian representatives. In view of the great difficulty, if not impossibility, of a single engineering works maintaining its own agent in Sao Paulo, the system recommended is that practised by the Americans and British, *viz.*, joint technical representation. Several fairly large concerns producing plant and machinery of a non-competitive nature pay a monthly contribution towards the expenses of an expert, who is thus enabled to keep up an office, showrooms, repair shop, and a stock of spare parts. This man must have a thorough knowledge of the language of the country (Portuguese), which, it is remarked, shows in its technical terms some marked differences from the language as spoken and written in Portugal.

Imports from Great Britain

Brazil's imports of electrical machinery and equipment from this country during 1929 and 1930, according to the Board of Trade figures, were as follows:—

	1929 £	1930 £	Inc. or dec. £
A.c. generators	4,461	18,755	+14,294
D.c. generators	3,032	3,264	+ 232
Traction motors	8,236	19,685	+11,449
A.c. motors	23,852	15,557	− 8,295
D.c. motors	4,586	2,172	− 2,414
Rotary convertors	2,329	1,290	− 1,039
Static transformers	22,352	12,596	− 9,756
Control and switchgear	86,764	45,044	−41,720
Unspecified machinery	21,968	9,487	−12,481
Cables, rubber insulated	10,098	4,334	− 5,764
„ other insulation	69,387	57,030	−12,357
„ telegraph and telephone	100,454	81,145	−19,309
„ submarine	6,430	—	− 6,430
Radio apparatus	8,704	13,812	+ 5,108
Telegraph and telephone apparatus	9,928	39,851	+29,923
Accumulators	4,235	6,217	+ 1,982
Lighting accessories and fittings	3,306	4,615	+ 1,309
House service meters	3,525	2,379	− 1,146
Total electrical goods and apparatus	315,176	301,309	−13,867

The Chilean Radio Market

The Department of Overseas Trade has prepared a report on the market for wireless apparatus in Chile, based on information supplied by the Commercial Secretary at Santiago. Firms interested in the export of radio apparatus of United Kingdom manufacture desirous of receiving a copy should communicate with the Department, 35, Old Queen Street, S.W.1, quoting reference number A.X. 11062.

"The First Hundred Thousand"

(FROM AN AUSTRALIAN CORRESPONDENT)

A LEADING article in the ELECTRICAL REVIEW for June 5th drew attention to the progress made by the Birmingham Corporation Electric Supply Department during recent years, culminating in reaching the first hundred thousand consumers. It may be of interest to readers "at home" to make a comparison between the Birmingham figures and those of the principal cities of Australia.

In the following table the Birmingham figures are taken from the ELECTRICAL REVIEW article and refer to the position as at the end of April last; those relating to the Australian stations are quoted from the last-published issue (1929) of *Tait's Electrical Directory of Australia*. The Australian figures, therefore, are about two years older than those of the Birmingham undertaking.

Station	Number of consumers	Population in supply area
Birmingham	100,500	1,000,000
Sydney (City Council) ...	164,805 (retail)	
" " " ...	14,918 (bulk areas)	825,750
" (Company) ...	23,125	167,000
Total	202,848	992,750
Melbourne (City Council) ...	23,600	†
" (Company) ...	120,864*	539,600
" (Commission) ...	19,050	88,753
Total	163,514	628,353
Adelaide	79,640	377,400
Brisbane (City Council) ...	33,690	
" (Company) ...	14,000	200,000
Total	47,690	200,000
Perth (City Council ...	28,891	137,000
" (W.A. Government)	6,370	150,000
Total	35,261	287,000
Hobart	13,273	50,000

*** The Company's business has since been acquired by the State Electricity Commission of Victoria. † Not stated but the area is small and compact, embracing the commercial, shopping, theatre and hotel quarters.**

In order to compare a typical English industrial town, such as Birmingham, with a typical industrial town in Australia, the figures relating to Newcastle (N.S.W.) are quoted. The City Council Electric Supply Department has 20,620 consumers, the population in the supply area being 125,000.

From the information given it will be observed that the ratio—consumers/population—is very considerably higher in all the Australian cases cited than that obtaining in Birmingham.

As an aid to consideration of the subject, the rates charged by the various Australian undertakings concerned are given:—

SYDNEY (*Council*): Domestic lighting or heating, 5d. per unit up to 2½ kWh per quarter per 100 sq. ft. of ground floor area, including verandahs, and 1¼d. per kWh for consumption beyond that allowance; the number of kWh charged at 5d. is increased by 2½ per quarter per 100 sq. ft. of each additional floor. Factory power from 1.5d. per kWh for 160 kWh used per quarter per h.p. connected to 0.6d. per kWh for 1,800 kWh per quarter per connected h.p. Factory lighting, 4½d. per kWh or, on maximum demand, at 5¼d. for one hour daily of maximum demand and 2¼d. in excess. Special rates for theatres and large commercial users. (*Company*): Lighting, 4.65d.; power, 5.15d. to 2.15d.; maximum demand, 1.65d. per kWh.

MELBOURNE (*Council*): Winter lighting, 3½d. to 2d. Summer lighting, 3d. to 1½d. Maximum demand rate, 6d. per kWh for energy equivalent to 45 hours' use per month of maximum demand and 1½d. per kWh in excess. Power, 1¾d. to 1d. (*Company*): These rates are not quoted here as the company's business has been acquired by the State Electricity Commission of Victoria, whose rates follow. (*Commission*): Two-part tariffs are in operation, the charges varying with the conditions governing costs in various areas. For domestic light and power a service charge based on the number of rooms is made and the energy is charged for at a low rate. For commercial power the service charge is based on the h.p. installed. There are sundry special tariffs and discounts. For this article it will suffice to quote the rate applying to the more important of the Metropolitan districts, remembering that the activities of the State Electricity Commission extend for some hundreds of miles in all directions. The rates charged for the Essendon-Flemington district of Melbourne are: Domestic supply, 1s. per room per month plus 1½d. per kWh. Commercial lighting, 1s. 6d. per room plus 1½d. Power, per h.p. per month from 4s. 3d. to 2s. 6d. plus ¾d. per kWh.

ADELAIDE: Lighting, up to 500 kWh per month, 7d. Over 500, 4d. Maximum demand, 8d. per kWh for first 450 hours' use per annum of the m.d. and 4d. in excess. Power, 3d. to 0.8d. with 7½ per cent. discount for power taken at unity power factor. Domestic power and heating, 2¼d. with 1d. for water heating. Special rates between 10 p.m. and 8 a.m.

BRISBANE (*Council*): Lighting, 6d. less 15 per cent.; domestic power, 2¼d. and 2d. less 15 per cent.; industrial power, 6d. per kWh for first hour's use of m.d. plus 1d. per kWh less 10 per cent. (*Company*): Lighting, 6d. less 10 per cent.; power and heating, 3d. to 2¼d. less 5 per cent. and 10 per cent. Various rebates and alternatives.

PERTH (*Council*): Lighting, 3¾d. to 2d.; industrial power, 2d. to 1d. and domestic power, 1¼d.

HOBART: Lighting, 5d. to 1½d.; power, 2d. to ½d.; domestic power 1d., and water heating ½d.

NEWCASTLE: Lighting, 3¾d. to 3d.; power, 1¾d. to 0.67d.; heating, 1¾d. to 1¾d.; domestic power, 1¾d.

Domestic Electrical Progress in South Africa

THE success of a scheme for the sale of domestic electrical appliances on the hire-purchase system in Cape Town and district is recorded in a recent report by a Canadian trade official. As was observable from the map of the system reproduced with Mr. G. H. Swingler's article in our issue of July 17th (p. 83), the city and its suburbs are built in the form of a wide crescent, stretching a distance of about thirty miles. The better-class suburbs are farthest out, and in these suburbs the heaviest demand for domestic electric equipment is encountered. This condition of affairs resulted in a peak load at the extremities of the power lines, and the technical difficulties prevented the encouragement of the sale of current for domestic use. But after the construction of new main stations and sub-stations it was possible to furnish all that was required.

In September last a hire-purchase scheme was inaugurated under municipal auspices. Under the scheme the consumer may purchase any of the appliances on an approved list. The municipality pays the importer immediately. The cost of this equipment is recovered from the consumer over periods of twelve, eighteen, or twenty-four months. In September, also, a flat rate for current for domestic use was instituted. So successful was this combined scheme that in spite of the prevailing depression, sales of electrical equipment in Cape Town rose immediately. Between September and June the municipality paid for £60,000 worth of electrical appliances under its hire-purchase scheme. This figure includes the landed cost, plus 25 per cent. profit to the importer.

On the approved list of the Commission are four electric refrigerators, three of which are of American and one of British manufacture; three water heaters, of which two are of South African and one of British origin; three washers and ironers, all American; twelve cookers, of which five are Canadian, four American, and three British; and eight kettles (only automatic safety type), of which five are of British origin. Another result of the inauguration of a hire-purchase system has been a marked increase in competition in all lines of domestic electrical appliances. For the smaller utensils Great Britain remains the principal source of supply, and a number of British manufacturers offer goods designed specially to meet South African requirements.

The Success of "All-in" Tariffs

The great increase this year in the use of an "all-in" rate for electricity for domestic purposes in South Africa prompted the Office of Census and Statistics of the Union to undertake a survey of this development.

The month of September, 1930, was selected as the most suitable period for investigation, as the consumption of electricity during that month is approximately equal to the average monthly consumption during the year. Following upon an examination of the tariffs in force in each centre, those most suitable for the purpose were selected, and on them was based a questionnaire which was submitted to the municipalities included in the appended table:—

Town	No. of consumers	No. of kWh per consumer	Average charge per kWh
Cape Town	22,303	61.5	2.690
Port Elizabeth	6,033	61.4	2.034
East London	2,340	51.1	2.852
Kimberley	2,826	40.7	4.948
Pietermaritzburg ...	1,858	107.9	1.708
Durban	13,723	235.2	0.989
Pretoria	8,206	97.5	1.889
Johannesburg	26,325	56.7	2.862
Bloemfontein	2,834	101.1	1.840
Germiston	2,282	31.1	3.448
Benoni	1,108	43.9	3.450
Krugersdorp	564	56.0	3.026

These statistics apply to 90,402 householders in twelve centres who consumed between them 8,134,368 kWh of electricity in September, 1930, or 90 units per household. Of these households, 59.51 per cent. consumed less than 50 kWh each, while 11.43 per cent. consumed over 200 kWh, or an average of 424.8 kWh each. Those consuming under 50 kWh a month paid on the average 4.2d. per kWh, and those consuming over 200 kWh 0.99d. per kWh. The cost per month for the former averaged 9s., and for the latter 34s. 11d.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Engineering Mathematics

In your issue of August 7th (page 203) the importance of mathematics in the educational training of an engineer was discussed by Mr. G. W. Stubbings. It would have been interesting if the author could have propounded a solution of the difficulty of remembering what is learnt at college, especially with regard to mathematical theories, instead of discussing the importance of mathematics (especially calculus and analytical geometry) to those who will be engaged in practical matters, and finally arriving at the question of giving up the study of higher mathematics, except by those who will be engaged in educational work.

In my opinion it is of utmost importance for an engineer to have a well grounded training in the basis of engineering mathematics, which really differentiate him from those who know only some basic principles and formulæ of algebra and arithmetic.

Mr. Stubbings stated that time spent in learning calculus and other branches of higher mathematics is considered to be more or less wasted with respect to those who can grasp technical problems by merely knowing the preliminary bases of mathematics. It seems to me that he has forgotten that there are some theories in electrotechnics, in mechanics, in theories of structure, &c., which cannot be solved easily without the aid of the calculus, especially integration. There are also other problems that cannot be solved without the use of differential equations and Fourier's theorem.

With regard to problems which can be solved by both higher mathematics and ordinary methods, the former method is more precise, and can be adopted in all cases; at the same time it may be shorter and more easily comprehended by those who have a good knowledge of mathematics, while others will fill in pages and pages to arrive at the result by following the roundabout method. It would be a great mistake to follow his advice to omit higher mathematics from engineering schools and colleges, even to allow time for the study of other subjects, such as economics, history, and mercantile law. I agree that the study of these subjects is of importance to engineers, but on the other hand they can be easily studied in books after leaving the schools or during leisure time, for they do not require special explanation by professors, as is essential in the case of mathematics.

A knowledge of higher mathematics can be acquired only during studentship and its lack tends to make the engineer take any formula for granted, perhaps because the formula is the result of some practical experiment, and he will not be convinced as to the accuracy of the results obtained. He will always try to find the proof of the formula and may not arrive at it, and thus he loses a great deal of time.

Higher mathematics is nowadays supposed to be the basis of recent researches. Derived formulæ or curves are frequently the results of some practical experiments, which otherwise could not be obtained if the experimentalist did not know higher mathematics. I gather that it is Mr. Stubbings' opinion that students should decide before entering engineering schools whether they will be practical engineers or educational trainers. I am sure they will be perplexed, as few can foresee their future career.

Finally I would ask Mr. Stubbings whether he will find a sufficient number of specialised professors for those who decide to study higher mathematics. I am sure, after this differentiation, such students will be not more than 5 to 10 per cent. of the whole.

Cairo, *August 21st*, 1931. S. A. ASHMAWY.

Distribution and Consumers' Engineers

In an article which appeared in your issue of July 3rd the question of suitability of switchboard attendants for their work was handled very thoroughly. That matter having now been settled, there still remains the question of the most suitable training for distribution and consumers' engineers, a subject on which the views of your readers would be of considerable general interest.

However efficient the power station may be, yet if a demand for the supply is not encouraged, the undertaking will not be a financial success. It is a well-known saying in publicity work that "the customer is the boss." Now as the two classes of engineers referred to are the ones which meet the consumers, their engineering training should be thorough and practical, and they should reach a high standard of technical attainment. For general engineering experience it is very wise for a student to be articled for five or even six years to one of the older reputable firms engaged in the maintenance and repair of electrical plant. The apprentice will then be able to see weak spots in design of dynamos, and the results of overloading in the case of motors. It is also a great advantage for an apprentice to have as a superior a corporate member of the Institution of Electrical Engineers for, should an apprentice show himself to be keen to get on, his superior would be pleased to propose him as a student of the Institution. During the course of apprenticeship it is well to make regular attendance at evening classes, as the facilities for technical training are widespread. During a period at a works an engineer, at the beginning of his career, meets men of various trades and ranks, and has thus a fair conception of the methods of handling workers when he occupies a responsible position. On completion of the works experience the two types may diverge a little and yet it is not a wide divergence. For engineers who wish to concentrate on distribution, there is a field in the operations of firms engaged in cable work, and transmission systems. For those who wish to become consumers' engineers, a good field of experience will be found in joining the staff of a registered contractor. Three or four years of experience under either of the above conditions should go far to equip the budding engineer for his future career. Of course, an interchange of direction in the course of experience will be a further advantage.

If the successes of the student at evening classes encourage him to continue his training at one of the universities for a three-year diploma course, practical experience subsequent to apprenticeship will be delayed, but the final achievement will be greater, and the student will be eligible for a more responsible position than he would have been otherwise. For consumers' engineers it is also an advantage to take a course of salesmanship relating to electrical devices.

No reference has been made to those who seek to enter the engineering profession by attending a technical institute and neglecting practical experience. Fortunately it is still definitely stressed that practical experience will be to the advantage of a candidate for a position. Again, it should be an encouragement to know that A.M.I.E.E. is superior to B.Sc., in that the former covers practical training and technical work, whilst the latter denotes only technical qualifications. It is unfortunate that students of technical institutes without previous practical experience often do not care to acquire works experience.

It is only by having engineers in the distribution and consumers' departments, who being thoroughly trained in general engineering are able thus to visualise the success of their plans, that the grid scheme will be fully developed. As the underlying principle of the scheme is cheaper and more readily available electricity, distribution and consumers' engineers should be so selected that they are ready to instil their own keenness into new consumers and thus make them enthusiastic in the use of electricity.

Cardiff, *August 31st*, 1931. B. A. CRONIN.

Legal

Interference with Shannon Scheme Overhead Wires

IN the District Court at Clonmel, County Tipperary, before District Justice Troy, a young man, James O'Dwyer, was charged with unlawfully and maliciously committing damage to a wooden standard, the property of the Electricity Supply Board, Dublin. Superintendent Fitzgerald of the Civic Guards, who prosecuted, said that the defendant had climbed up a tree, and had thrown a piece of wire across a h.p. line. In consequence he had received a shock which rendered him unconscious for a day and a night. The wind blew the loose wire to the nearest pole where there was a short circuit, and the pole was partly burned. The cost of labour and repairs to the pole amounted to £3 8s. Mr. J. G. Skinner, solicitor for the defendant, said that there was no malice or criminal intent whatever. The boy got up a tree and did a foolish thing at the risk of his own life. If he had thought there was any danger he would not have done it. District Justice Troy said that there was plenty of warning about the consequences of interfering with electric wires. The defendant, in reply to Mr. Skinner, stated that he was willing to pay for the damage done. District Justice Troy said that if the defendant did not pay some of the £3 8s. before the next Court day, he would have no hesitation in sending him to gaol.

Hire-purchase of Vacuum Cleaners

WHEN Viking Sales, Ltd., of Peter Street, Manchester, sued women defendants at Bolton County Court, on August 26th, for sums alleged to be owing on the hire-purchase sale of vacuum cleaners, the registrar said that if the facts brought to his notice were true, there had been mis-representation in getting the women to sign a contract. One woman alleged that the canvasser promised to find her work if she made the purchase and that otherwise she need not pay anything. Another woman said that she could not get rid of the representative, and that he undertook to take the machine back if her husband was not agreeable. The registrar said that many of this class of case were very unsatisfactory. Some purchasers complained that the machines were foisted on them and that they had difficulty in getting the firm to take the things back. In each instance the registrar found for the defendants.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged, and all subsequent proceedings will be taken.

1929

33,570. "Combined sound-reproducing and kinematograph apparatus." H. J. Kuschenmeister. February 4th, 1930. (354,241.)

1930

3,510. "Protective systems for the electric network at power stations and sub-stations." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. February 6th, 1929. (354,296.)

6,853. "Devices for supporting overhead electric conductors." J. S. Highfield and W. E. Highfield. March 1st, 1930. (Cognate applications 17,486/30 and 27,032/30.) (354,171.)

6,983. "Electric furnaces." Carborundum Co., Ltd. (Carborundum Co.). March 3rd, 1930. (354,172.)

7,283. "Electrical condenser consisting of two or more separate condensers suspended one from the other to form a chain." Elektricitäts Akt.-Ges. Hydrawerk. March 5th, 1929. (354,220.)

7,592. "Electrical conduit fittings, and junction boxes for use in connection with electrical wiring conduits." Simplex Conduits, Ltd., and H. F. McLoughlin. March 8th, 1930. (Cognate application 36,245/30.) (354,335.)

7,664. "Ventilation of dynamo-electric machines." M. Adamcikas and G. Massera. March 8th, 1930. (354,337.)

11,090. "Electrical reproduction of sound." A. M. Low. April 8th, 1930. (354,341.)

13,080. "Signalling arrangements applicable to telephone systems." Siemens Bros. & Co., Ltd., and W. H. Grinsted. April 28th, 1930. (354,250.)

13,087. "Thermionic valves." A. E. Blondel. April 27th, 1929. (354,182.)

13,156. "Electrically-operated stamp for ore-crushing or other purposes." H. M. Davis. April 29th, 1930. (354,183.)

13,180. "Picture and the like transmission systems." Marconi's Wireless Telegraph Co., Ltd. May 3rd, 1929. (354,252.)

13,372. "Apparatus for forging and roughing-out iron and steel bars by electricity." Soc. Holding des Brevêts et Procédés Giacchino pour l'Ebauchage Electrique. April 30th, 1929. (Addition to 288,488.) (354,188.)

13,438. "Low-frequency amplifiers." L. Cadenel. May 1st, 1930. (354,192.)

13,509. "Insulation of electrical conductors." K. G. Maxwell, P. G. Ashley, and Associated Electrical Industries, Ltd. May 2nd, 1930. (354,350.)

13,697. "Dynamo-electric machines." J. Stone & Co., Ltd., and A. E. Honey. May 3rd, 1930. (354,212.)

13,726. "Electrolytic apparatus." A. E. Knowles. May 5th, 1930. (354,232.)

13,791. "Reproduction on a reduced scale of the voltage of a high-voltage a.c. system." A. Reyrolle & Co., Ltd., and H. Leben. May 5th, 1930. (354,236.)

13,920. "Apparatus for the control of electric circuits." J. Zetsche and J. Sinclair-Ross. May 6th, 1930. (354,358.)

14,028. "Positive plates for electrical storage batteries." S. J. Williams. May 7th, 1930. (354,318.)

14,055. "Dynamo-electric machines." British Thomson-Houston Co., Ltd., and F. P. Whitaker. May 7th, 1930. (354,321.)

14,080. "Direction-finding apparatus." Marconi's Wireless Telegraph Co., Ltd., and T. L. Eckersley. May 7th, 1930. (354,322.)

14,246. "Electrical condensers." P. R. Coursey and Dubilier Condenser Co. (1925), Ltd. May 9th, 1930. (354,373.)

14,358. "Production of insulating materials." Electrical Research Products, Inc. February 3rd, 1930. (Addition to 307,966.) (354,380.)

14,698. "Arc electrodes for use in therapeutic treatment, in the treatment of food, and in like processes." W. G. Moore. May 13th, 1930. (Addition to 327,464.) (354,404.)

14,707. "Automatic or semi-automatic telephone exchange systems." Standard Telephones & Cables, Ltd., and E. P. G. Wright. May 13th, 1930. (354,405.)

14,712. "Electric motors." J. Zetsche and J. Sinclair-Ross. May 13th, 1930. (354,406.)

14,717. "Electric railway trucks." C. Kirchner. May 13th, 1930. (354,407.)

14,740. "Electric signalling devices particularly suitable for road traffic purposes." British Thomson-Houston Co., Ltd. May 13th, 1929. (354,409.)

14,818. "Electric switches for wireless receiving apparatus." Benjamin Electric, Ltd., and H. S. Haring. May 14th, 1930. (354,411.)

15,007. "Electromagnetic vibratory devices, such as loud-speakers." Gramophone Co., Ltd., A. S. Radford, and F. Ellis. May 15th, 1930. (354,413.)

15,023. "Regulation of the direct potential in load circuits of arc-light rectifiers." Siemens-Schuckertwerke Akt.-Ges. and Ges. für Oberbauforschung. November 12th, 1929. (354,414.)

15,036. "Dry-cell electric battery." Burgess Battery Co. May 16th, 1929. (354,415.)

15,906. "Volume control of radio receivers." Kolster-Brandes, Ltd. October 22nd, 1929. (354,426.)

16,002. "Radio direction finders." R. A. W. Watt, R. H. Barfield, and L. H. Bainbridge-Bell. May 24th, 1930. (354,429.)

16,032. "Electric heating devices and the manufacture thereof." Credenda Conduits Co., Ltd., and P. W. Davis. May 24th, 1930. (354,430.)

16,403. "Suspension clamps for electric power-transmission lines." T. J. Kinsey and J. L. Gaved. May 28th, 1930. (354,440.)

16,506. "Coin-controlled circuit-breaking devices." F. B. Dehn (Mills Novelty Co.). May 28th, 1930. (354,442.)

16,709. "Covering tiles employed to protect electric cables laid in the ground." W. J. Bridge. May 30th, 1930. (354,446.)

17,288. "Electric discharge rectifiers." British Thomson-Houston Co., Ltd. June 25th, 1929. (354,452.)

17,321. "Thermionic valve amplifiers." Gramophone Co., Ltd., and H. C. Atkins. June 4th, 1930. (354,453.)

17,531. "Telephone systems." Coventry Automatic Telephones, Ltd., J. E. Collyer, and O. I. Carpenter. June 6th, 1930. (354,459.)

18,168. "Apparatus for the conversion of electrical signals into sound." General Electric Co., Ltd., and D. A. Oliver. June 13th, 1930. (354,467.)

18,286. "Electric heating bodies." H. Berthold. February 11th, 1930. (354,468.)

18,287. "Electric heaters." H. Berthold. May 26th, 1930. (354,469.)

18,511. "Road-traffic control signalling apparatus." F. V. Boardman. June 17th, 1930. (354,475.)

18,738. "Delayed-action electrical indicator." E. L. M. van Gelder. June 19th, 1930. (354,481.)

19,232. "Automatic overload switch for electric installations." Siemens-Schuckertwerke Akt.-Ges. December 24th, 1929. (354,489.)

19,363. "Electric lampholders." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 12th, 1930. (354,495.)

19,897. "Junction boxes for electric cables." F. W. Green. July 1st, 1930. (354,504.)

20,196. "Electric motor control systems." Igranic Electric Co., Ltd. (Cutler Hammer Manufacturing Co.). July 3rd, 1930. (354,513.)

20,229. "Combined apparatus for the recording or reproduction of talking-machine records or radio signals." Gramophone Co., Ltd., and A. Whitaker. July 3rd, 1930. (354,514.)

21,558. "Loaded long-distance cables." Siemens & Halske Akt.-Ges. July 18th, 1929. (354,523.)

22,314. "Devices for feeding filaments to machines for making incandescent electric lamps." General Electric Co., Ltd. August 17th, 1929. (Patent of addition not granted.) (354,530.)

23,474. "Method of and arrangement for regulating the voltage in an electrical circuit." Naamlooze Vennootschap Stabilovolt. August 20th, 1929. (354,550.)

24,605. "Electric igniters." J. Bolom and M. Horsky. August 16th, 1930. (354,559.)

25,153. "Devices for indicating the position of airplanes in air traffic." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). August 22nd, 1930. (354,563.)

25,576. "Radio-telegraphic apparatus." Soc. Anon. Brevettie Italiani Esteri S.A.B.I.E. August 28th, 1929. (354,568.)

25,761. "Television, tele-cinematograph and like systems." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. September 25th, 1929. (354,572.)

26,205. "Electric insulators." J. W. Hofmann (trading as J. W. Hofmann). September 20th, 1929. (354,581.)

28,246. "Safety-glass bell for electric mining lamps." R. Eilenberger. September 22nd, 1930. (354,594.)

28,749. "Thermionic amplifiers and control devices therefor." Marconi's Wireless Telegraph Co., Ltd. October 29th, 1929. (354,605.)

29,652. "Overhead contact line systems for electrically-operated vehicles." G. F. Baddeley. October 3rd, 1930. (354,609.)

31,006. "Talking-heads for electro-magnetic sound-recording." Telegraphie-Patent-Syndicat Ges. October 16th, 1929. (354,618.)

31,402. "Sealing-in bodies for vacuum tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 2nd, 1929. (354,620.)

32,393. "Television apparatus." Fernseh Akt.-Ges. October 29th, 1929. (354,630.)

32,494. "Rotary electric switches, particularly for wireless apparatus." L. H. Reid. October 29th, 1930. (354,632.)

36,725. "Holders for electric incandescent projection lamps." General Electric Co., Ltd. February 7th, 1930. (354,661.)

37,940. "Multicore high-tension electric cables." Siemens-Schuckertwerke Akt.-Ges. January 25th, 1930. (354,665.)

38,094. "Underground electric cables." Ceat Conduttori Elettrici ed Affini-Torino, M. Barberis, and U. Baggi. December 17th, 1930. (354,667.)

1931

3,107. "Electric ceiling fans." General Electric Co., Ltd., H. J. Eley, and W. M. Cranston. January 30th, 1931. (354,681.)

Trade Mark Applications

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from August 26th.

Spekker Steeloscope. No. 524,117. Class 8. Apparatus for analysing metal alloys.—Adam Hillger, Ltd., 24, Rochester Place, Camden Town, N.W.1.

Gramme. No. 524,160. Class 13. Electric lamps (ordinary).—Electrical Agencies (London), Ltd., 1, Warwick Court, High Holborn, W.C.1.

Century (lettering and design). No. 523,783. Class 13. Electric lamps (ordinary).—Century Lamps (London), Ltd., No. 6 "O" Building, Upper Thames Street, E.C.4.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester.—Houses (85), various parishes; R.D.C. surveyor.

Amble (NORTHUMBERLAND).—Houses (40), for the U.D.C.; W. Burton, surveyor.

Atherstone.—Houses (70); R.D.C. surveyor.

Barnsley.—Municipal buildings, for B.C.; A. D. Mason, town clerk.

Basingstoke.—Houses (118), Worting Road; U.D.C. surveyor.

Beccles.—Houses (£10,500); Wm. Tickner, Lowestoft.

Belper.—Houses (54), Whitmoor estate; L. F. Smith, architect.

Birkenhead.—Offices, Preston, for the Public Health department; borough engineer.

Blackpool.—Houses (300); H. F. Keighley, architect. Biscuit factory, Devonshire Road, for Messrs. Bee Bee Biscuits, Ltd., Sutherland Road; J. H. Andrews & Butterworth, architects, 9, St. James Square, Manchester.

Bolton.—Chapel, Great Lever district, for the Rev. W. Leighton; Harold Greenhalgh, 15, Mawdsley Street. Houses (26), Old Kiln Lane and Chorley New Road; T. P. Smith, Ltd.

Bournemouth.—Houses (12), Wimbourne Road; H. C. Barnes. Development, Littledown estate; Fox & Sons. Hotel, Overcliffe Drive; H. Whiting & Son. Re-erection of joinery works, Muscliffe Road, Winton, for George Jenkins, The Nook, Portland Road. Stores, Malmesbury Park Road; Dibbens, Ltd. School boarding houses, Branksome Hill Road; Bournemouth School for Girls.

Braunton (DEVON).—Cinema theatre, Exeter Road, for G. A. Drake.

Brierley Hill (STAFFS.).—Houses (192), Moor Lane estate, for the U.D.C.; John Yorke, surveyor.

Bucklow.—Houses (25), Moss Lane, Partington; H. V. Shaw, engineer to the R.D.C., Station Buildings, Altrincham.

Chelmsford.—R.C. schools (250 places), rear of St. Philip's Priory, for the managers; secretary, 35, London Road.

Chesterfield.—Houses (50), Whittington estate; borough engineer.

Chichester (SUSSEX).—Post office, for H.M. Office of Works, King Charles Street, London, S.W.

Chorley.—Alterations, New Market Street; Britannic Assurance Co., Ltd. Hospital, Rookwood; Baxendale Bros., Ltd., builders. Works, Curate Street; E. D. Robinson & Sons. Installation of electric lighting in St. Joseph's School; the managers.

Croydon.—Three shops, South End; R. K. Kruse.

Darlington.—Cinema (1,700 seats), at Bondgate; J. Clayton, architect, High Row. Extensions to St. Joseph's R.C. Church; T. Rogers, builder, Valley Street.

Douglas (I.O.M.).—Telephone exchange for H.M. Office of Works; Universal Housing Co., builders, Peel Road.

Dunfermline.—Houses (200); burgh surveyor.

Durham.—Offices for Guardians' Committee and surveyor's department, Sedgefield, for the C.C.; W. J. Merrett, county surveyor, 43, Old Elvet, Durham. Extensions to Birtley (£18,000), Leadgate (£6,000), and Spennymoor Four Lane Ends schools (£12,250) for the C.C.; F. Willey, architect, 34, Old Elvet.

East Sussex.—School extensions, Burgess Hill, for the county E.C.; E. A. Verger, county architect, Lewes.

Eccles (MAIDSTONE).—Church, for the Wesleyan trustees; H. H. Stone, architect, Ramsgate.

Essex.—Nurses' homes, Epping and Romford Institutions (48,000); county architect, Chelmsford. Secondary school, Epping, for the county E.C.

Eston.—Houses (286) for the U.D.C.; C. W. Cockersall, Cleveland House, South Bank-on-Tees.

Falkirk.—Employment exchange; architect, H.M. Office of Works, 122, George Street, Edinburgh.

Faringdon (BERKS.).—Houses (182) for the R.D.C.; surveyor.

Fenton.—Baths, Whieldon Road; Stoke-on-Trent city engineer.

Gateshead-on-Tyne.—Houses (108), Victoria Road, for the T.C.; F. H. Patterson, borough engineer. Methodist church, Sunniside; S. J. Stephenson, 2, Saville Place, Newcastle.

Glasgow.—Premises, Oswald Street, for John Wallace, Jamaica Street; Bailie N. MacWhannell, architect, 233, West Regent Street.

Godalming.—Houses (100) at Eashing housing estate for the B.C.; G. Bertram Hartfree, architect and surveyor, High Street.

Greenock.—Extension of Academy (£3,000); Dean of Guild Court. Reconstruction of Garvel Graving Dock (£27,000); Melville, Dundas & Whitson, contractors, Glasgow.

Hampshire.—School (500 places), Havant, for the county E.C.; director of education, Winchester.

Hartlepool.—Houses (500) for slum clearance schemes; borough engineer.

Hayling Island (HANTS.).—Telephone exchange, for H.M. Office of Works, King Charles Street, London, S.W.

Hemsworth.—Extension of sewage disposal works, Grimethorpe Lane, Brierley; W. T. Lynam, R.D.C. engineer.

High Wycombe (BUCKS.).—School, Harlow Road, for St. Augustine's R.C. managers; priest-in-charge.

Hollingbourne (KENT).—Development, Heathfield estate; Clarke & Epps, Maidstone.

Huddersfield.—Rebuilding Woolpack Hotel, Lockwood, with electrical work; Abbey & Hanson, architects, 11, Cloth Hall Street. Extension of the Huddersfield Royal Infirmary; Calvert and Jessop, and Jos. Berry & Sons, joint architects, 1, Market Walk.

Hull.—School (300 places), Southcoates Lane; Catholic authorities.

Huntly.—Kinema; D. & J. R. M'Millan, architects, 105, Crown Street, Aberdeen.

Irish Free State.—(DUBLIN).—Nurses' home and maids' quarters, Mary Street, for the Governors of Jervis Street Hospital; W. H. Byrne & Son, architects, 20, Suffolk Street.

Jarrow-on-Tyne.—Post office, North Street; Randle & Co., Ltd., contractors, Back Dunelm Street, Sunderland.

Kent.—Nurses' home, Coxheath Institution, for the C.C.; W. H. Robinson, county architect, Springfield, Maidstone.

Lanarkshire.—Schools, Airdrie (2) and Kirkg's Park, near Glasgow (£96,000) for the C.C. of Lanark; the architect, C.C., Hamilton.

Leeds.—Structural alterations to school, Adel; H. Acfield, city engineer, Municipal Buildings.

Liverpool.—Alterations to Belmont Road Hospital; land steward and surveyor, Municipal Buildings. Houses (606), Dovecot estate; Unit Construction Co. and Walter Spencer.

London.—(E.C.).—Extensions, Sir John Cass Institute; governors. (FINCHLEY).—Elementary school, Woodside estate, for the E.C. (ILFORD).—Extensions, Chadwell Isolation Hospital, for the T.C.; L. E. J. Reynolds, borough engineer. (LAMBETH).—Extensions, Morley College, Waterloo Road; L.C.C. architect. (LEWISHAM).—School (450 girls), Bellingham; L.C.C. architect. (MANOR PARK).—School centre, Kensington Girls' School; East Ham borough engineer. (MUSWELL HILL).—Church for St. Matthew's; W. D. Caroe, architect. (SHOREDITCH).—Trade school, Cassland Road; L.C.C. architect. (WANDSWORTH).—New wing, Technical Institute; L.C.C. architect.

Machynlleth (MONT.).—Cottage hospital; Nursing Association.

Manchester.—Kinema, Slade Lane, Longsight; Harold Davis, architect, 4, St. Mary's Parsonage. Additions, Coronation Hall picture house, Longley Lane, Northenden; licensee. Schools, Bowker Vale and Victoria Avenue; and extensions to mental block, Crumpsall Hospital, and Christ Church Municipal School, Hulme; city architect. Houses (160), Heaton Park estate; Gerrard & Sons, Ltd. Jewish school and synagogue, King's Road, Sedgley Park; rabbi.

Middlesbrough.—Hospital buildings at maternity centre for the T.C.; S. E. Burgess, architect, Municipal Buildings. Extensions to Newlands Convent for the R.C. authorities.

Newcastle-on-Tyne.—Alterations to Glendall Hotel; W. J. Smith, architect, 4, St. Thomas Street. Alterations to the Oxford Galleries; Mr. McEwan, contractor, Back Lynwood Terrace. Extensions, Duke of Argyle Hotel, Argyle Street; S. H. Lawson, architect, Emerson Chambers. Extensions, nurses' home at City Hospital for Infectious Diseases, Walkergate. Municipal aerodrome, Pontelancs Road, for the C.C.; W. J. Steele, city engineer, Town Hall. Alterations to the premises of the Sylvan Preserving Co., Ltd.; James Lunn & Sons, builders, St. Mary's Place.

New Longton.—Church for Parochial Council of All Saints' Church; Mr. Robert Martin, diocesan surveyor, 90, Deansgate, Manchester.

New Seaham (DURHAM).—Hotel for Messrs. J. Nimms & Son, Ltd., Castle Eden; G. A. Burton, architect, Shipping Chambers, George Street, West Hartlepool.

Northern Ireland.—(BELFAST).—Sanatorium at Down County Infirmary; W. H. Stevens & Sons, chartered surveyors, Donegall Square.

Northfleet.—Fire station and library; U.D.C. surveyor.

Northwich.—Extension of Winnington sewage disposal works; Wm. Beckett, engineer, Victoria Station House, London, S.W.1.

Nuneaton.—Kinema, Lister Street; H. Mayo & Co., architects.

Osmotherley (NR. NORTHALLERTON).—Reconstruction of Wesleyan church; trustees.

Padiham.—Houses (200); U.D.C. surveyor.

Perth.—Shops, tea rooms, and billiard rooms; J. McLaren Taylor, Blackford.

Rhayader (RADNORSHIRE).—Houses (24) for the U.D.C.; Holford Mills, architect.

Romsey.—Houses, Lockerley (24) and Braishfield (8); R.D.C. surveyor.

St. Helen's.—Extension of St. Vincent's R.C. school; rector.

Shap (CUMBERLAND).—Houses (20) for the U.D.C.; surveyor.

Shardlow (DERBYSHIRE).—Houses (52) for the R.D.C.; H. T. Sudbury, architect, Rutland Chambers, Lord Haddon Road, Ilkeston.

Slough.—Houses (70) Farnham estate; U.D.C. surveyor.

South Shields.—Additions to Messrs. Rippon & Co.'s premises, Denmark Street; Christie & Sons, builders, Commercial Road. Alterations and additions to Baring Street Boys' School for the E.C.; H. Hill, architect, 10, Winchester Street.

South Stoneham (HANTS.).—Houses (28), Netley, for the R.D.C.; S. T. Paul, builder, Southampton.

Stockbridge (HANTS.).—Houses (26); R.D.C. surveyor.

Stockport.—Infirmary, Dialstone Lane, for the Board of the Stockport Infirmary; Thomas Worthington & Sons, architects, 178, Oxford Road, Manchester.

Stretford.—Extension of works premises, Skerton Road, for J. & H. Paterson, Ltd., 96, Oxford Road, Manchester; R. Carlyle and Co., builders, Elsinore Road, Old Trafford, Manchester.

Sunderland.—Improvements, St. Mark's Church; J. Carter, contractor, Deptford Terrace. Conversion of Ashburton House into art school for the E.C.; O. T. Mark, John Street.

Swinton and Pendlebury (LANCS.).—School (1,320 places), Moorside ward, for the E.C.; Ralph & Proude, architects, Wigan. Extensions, Cromwell Road schools; H. Entwistle, surveyor.

Wallasey.—Elementary school, Gorsedale Road; Quiggin and Gee, architects, North John Street, Liverpool.

Washington (CO. DURHAM).—Houses (24), for the U.D.C.; surveyor.

Watford.—Public baths (£28,373) for the T.C.; William Moss and Sons, Ltd., builders, North Circular Road, Cricklewood, N.W.

Westslade (NORTHUMBERLAND).—Housing schemes at Dudley, Seaton Burn, and Annitsford, for the U.D.C.; J. McNaught, surveyor, Dudley.

Wem (SALOP).—Housing scheme for the U.D.C.; surveyor.

White Waltham (MAIDENHEAD).—Houses (38), Breadcroft Lane, for T. B. Bissley.

Wolverhampton.—Cinema, Agricultural Hall site; Associated British Cinemas, Ltd.

Yeovil.—Houses (117), Preston Grove, for the T.C.; borough surveyor.